VOLUME 155
NUMBER 1

AMERICAN GAS JOURNAL

WHOLE
NUMBER 3811

ESTABLISHED 1859

JULY, 1941

PUBLISHED MONTHLY BY
AMERICAN GAS JOURNAL, Inc.
53 Park Place, New York

S. G. KRAKE, *President and Treasurer*
M. E. KELLEHER, *Secretary*
A. I. PHILLIPS, *Editorial Director*
H. T. MATTHEW, *Business Manager*
JAMES C. MUNN, *Midwest Representative*
10515 Wilbur Ave., Cleveland, Ohio
Tel. Garfield 1055
THOMAS MORGAN, *Western Representative*
168 N. Michigan Ave.
Chicago, Ill.

Copyright 1941, American Gas Journal, Inc.

Subscription $2.00 per year U.S.A.; $3.00 Canada; $4.00 Foreign. Single copies, 25 cts.

CONTENTS

The New Gas Plant at Portland, Ore.—Arthur J. Larson 7

The Opportunity of the Gas Industry to Help Our Country and Itself in These Days of Great National Emergency—Paul B. McKee 9

Water Heaters—D. J. Hendrickson 13

Planning Merchandising Campaigns—H. W. Edmund 18

Some Reflections and Observations on Accounting—Hall M. Henry 21

Filling Gas Mains with Grease to Make Emergency Shut-Off —H. B. Andersen 27

Lowering Heating Cost by Humidification—O. J. Kuenhold .. 30

Gas-Fired Kitchen Equipment Pleases Restaurateur—John E. Hubel 31

Oil Requirements of the Manufactured Gas Industry 32

Review of New Higher Court Cases Involving Gas Explosions —Leo T. Parker 33

This Simple Chart Gives the Safe Strength of Wooden Beams —W. F. Schaphorst 35

Book Reviews 36

News of the Gas Industry 37

Photos by Robert Yarnall Richie

For everyone in 'forty-one it's

...in good hands

Skilled hands, these . . . employed throughout the processes of manufacture . . . and expert judgment reflected, too, by outstanding gas companies the country over—who consistently specify AMERICAN Tinned Steelcase Meters. ▷ Meters stand or fall by their performance in actual service. The service records of AMERICAN Tinned Steelcase Meters . . . from every viewpoint of accuracy, ruggedness, low-cost maintenance, and return upon investment . . . are written plainly in the long, distinguished roster of their gas company owners. ▷ Revised Catalog TG-4 is an invaluable guide to all the significant improvements made recently in tinned steelcase meter design and construction.

GENERAL OFFICES • 60 EAST 42ND STREET, NEW YORK, N. Y.

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

1651

TINNED STEELCASE METERS

JUL 15 1941

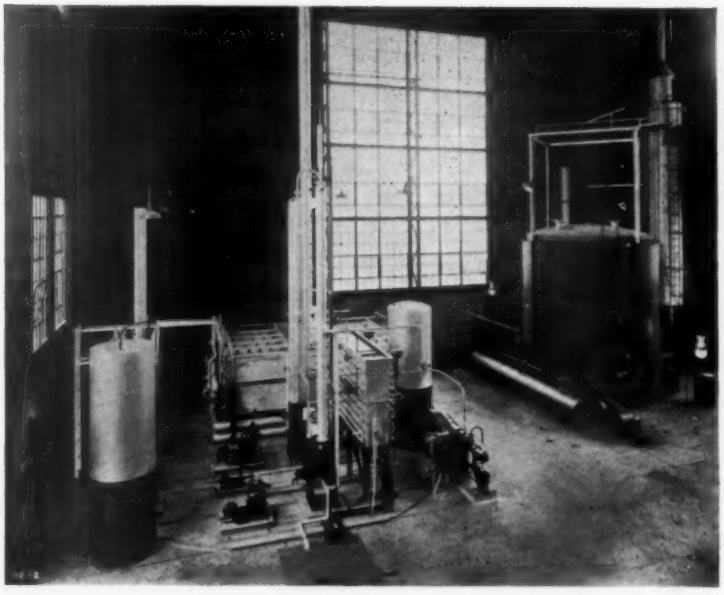
JULY
1941

AMERICAN
GAS JOURNAL

VOLUME 155
No. 1

The New Gas Plant at Portland, Oregon

By
Arthur J. Larson



Close-up of Portland Gas & Coke Co.'s "Miniature" plant using advanced methods for producing chemicals and where many phases of industrial chemistry were tested and proved.

THE PRIZE usually goes to the company or engineers of a company who take a handicap and by research and experimentation turn that handicap into something useful which mankind can use. The result is always the same: more profit for the company who dares to try something different.

This may be termed the story of chemical cash in which the Portland Gas & Coke Company, Portland, Oregon, by research and experimentation now gleans most profit from its by-products, with the result that a $1,500,000 expansion program is underway which will make Portland the chemical center of the northwest.

So now this $1,500,000 "baby"—a chemical plant—will be a giant when completed this year adjacent to the utility's present gas works.

This Oregon company purchases oil refinery residuum, rated of little use in California, brings it to Portland in tanker ships and its chemists turn the "waste" into commercial gas and a lot of other products very useful to man.

Several questions arise: Why has this utility turned so extensively to the making of special by-products? Why is the "waste" of the refineries used instead of crude oil direct from the wells as it is far richer in gas? Why do the refineries sell their residuum rather than making gas and chemicals from it?

To answer this series of questions it is well to go back and see what the facts are. It is well known that the oil refineries break down crude petroleum and get gasoline. Also wring out further products such as kerosene, lubricating oils, diesel and fuel oils.

Oil refineries crack up the crude oil at low temperatures. If they were interested they probably could carry the process into higher temperatures to obtain further by-products as well as gas. Why they don't is: In the oil regions are immense supplies of natural gas; they do not want artificial gas. Natural gas can be offered to the consumer much more cheaply than manufactured gas in these oil regions. Natural gas may be piped hundreds of miles to serve some large community at rates lower than manufactured gas in the same community.

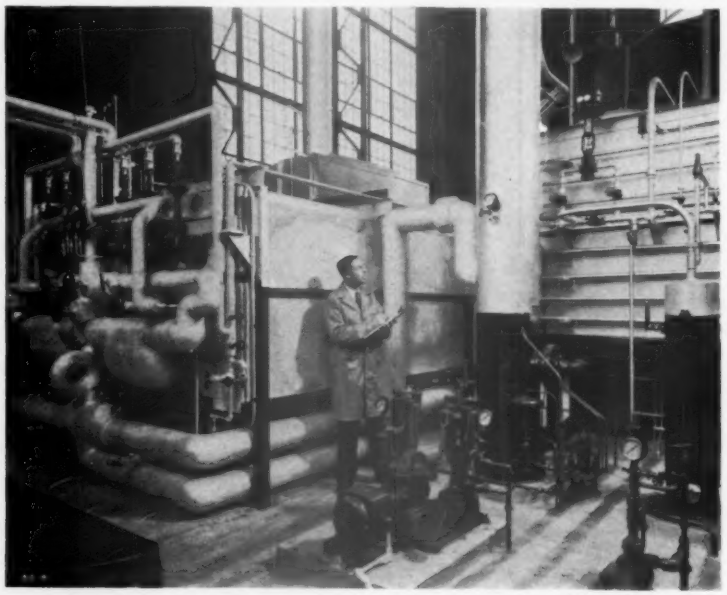
So the oil refineries are only too glad to sell residuum or oil sludge for which there is no use in their locality, as well as to stop cracking the crude oil short of the point at which it would become too thick to be pumped and transported in tankers.

Thus the Portland utility fits into the picture and is a boon to the oil refineries who send this "waste" north in tankers, from which the utility makes gas for its customers. It remained for the research department and chemists and engineers of this utility to capture and use the other chemicals and substances which the residuum contains — and which were captured and resulted in the $1,500,000 chemical plant expansion.

These by-products are produced in such quantity that they provide about one-fourth of the company's gross sales. These by-products include benzol for Gasco motor fuel; toluol for solvents and TNT; petroleum coke for aluminum furnace electrodes;

microsulfur; naphthalene; carbon bisulfide for soil insecticides, noxious weed and rodent killers; ethylene compound for anti-freeze for cars and for liquid-cooled airplane motors; high-grade road tar; briquet fuel; commercial lampblack, and other things all of which came from what was once regarded as handicaps. In a year's time this utility has sold 1,683,431 gallons of benzol; 1,523,652 gallons of tar and 42,367 tons of briquets just to list some of the bulkier by-products.

The company prefers to process residuum instead of crude oil because it can maintain a proper balance between volume of gas and amount of by-products needed. The cost of "waste" from refineries is much below that of crude oil. While the cost per 1,000 cubic feet of gas obtained out of the cheaper material may be greater or less, this is not the determining factor of purchase. The utility knows they can make a profit if enough by-products are wrung from the "waste". So it prefers a raw material low in proportion of gas but containing by-product possibilities which make a big yearly profit.



A gas engineer of Portland Gas & Coke Co., checking operation of the "miniature" plant in which exhaustive tests were made for two years.

In its chemical operations the utility expects to produce 500,000 gallons of toluol which is an essential ingredient in the manufacture of TNT and other high explosives. To further illustrate the point of why the "waste" product from the oil refineries is preferred is that for the sake of comparison a year's supply of gas could be manufactured from 6 tanker-loads of crude oil instead of say 18 tankers of "waste". But in this hypothetical illustration there would not be even 200,000 gallons of toluol.

Specific gravity of the "waste" used by the utility is 8.5 A.P.I. as compared with approximately 16 for the higher grade oil previously used. This company is the foremost specialist in the manufacture of refined and re-refined by-products, in the connection with manufacture of gas, in the United States.

The reason low-gravity residuum had never been used for gas-making prior to the Portland company's successful development of a new method five years ago was that it produced so much lampblack in the conventional gas generator that the equipment became quickly clogged. Then the generator would have to be shut down, cooled off, and excess lampblack laboriously scraped off, which was very costly and impractical. This was a decided handicap.

Necessity of holding down operating expenses impelled this utility's engineers, headed by E. L. Hall, vice-president and chief engineer, to seek some way around this handicap. President Paul B. McKee was very interested in the problem and did everything possible to help secure the solution.

The cracking problem as intimated above was when low-gravity crude "waste" or residuum was used in the ordinary gas generator, a huge silo-like cylinder, the equipment quickly became clogged with lampblack. This meant shutting down and complete cooling of the generator, which had to be cleaned and then had to be reheated to its proper temperature approximately 1800 degrees F. to be ready to function again. A most troublesome and expensive condition.

The engineers when confronted with this cracking went to work and soon found the answer. It was perfectly simple and resourceful.

The problem was solved by building the generators in pairs, with tube cross-connection between the two. As a gas-making cycle ends, the generator walls are thick with lampblack glowing white-hot but in a vacuum. As soon as the gas is out of the way air is forced down through one generator and up through the other. Admission of oxygen starts the lampblack burning, as it could not do in the vacuum, and this way the walls are reheated in preparation for starting up gas-making again. Thus the engineers' solution stopped the problem of shutdowns because of lampblack and actually turned the presence of lampblack to useful and time-saving purpose. From then on the exclusive use of "waste" or residuum was entirely practicable at the utility's plant.

As pointed out this development not only solved the problem of excessive lampblack but also eliminated the need for burning oil to reheat the generators. It was a major advance in progress in that it permitted use of "waste" from the oil refineries, but still the utility's output of by-products was limited to a fixed ratio between gas send-out and the amount of by-products yielded. The problem was to put more oil through the plant, wring out a higher proportion of by-products and hold gas production in line with customers' use.

So again the company engineers and chemists got busy and had many ideas about possible variations in the process as the result of laboratory experiments. Another handicap that loomed was that to try out these ideas in a large plant would mean high expense, because the minimum quantities of raw material required for a test run in the big generators might prove tricky as well as expensive, and second, it would interrupt steady production of uniformly high quality gas and by-products which had to be maintained.

How was this handicap solved?

Very simply. To bridge the gap between test-tube experimentation and actual operation a "miniature" or "pilot" plant was built to scale in one corner of the utility's No. 2 generator house. In other words this

was a complete gas works in miniature, with its own by-products recovery equipment, big enough to approximate the actual conditions encountered in large scale operation and small enough to make possible tests with small quantities of raw material.*

Results obtained from months of work with this miniature plant encouraged chemists and engineers to build another and much more advanced experimental unit, which proved to be so fool-proof that it was the defeated handicap upon which the $1,500,000 expansion program was announced.

When the new plant is completed it will take the same oil residuum and crack it in a Knowles coking oven instead of the present type of generator. These coking ovens, of which there will be four in the new units, are horizontal instead of vertical. Their refractory linings are to be heated by gas to a high temperature.

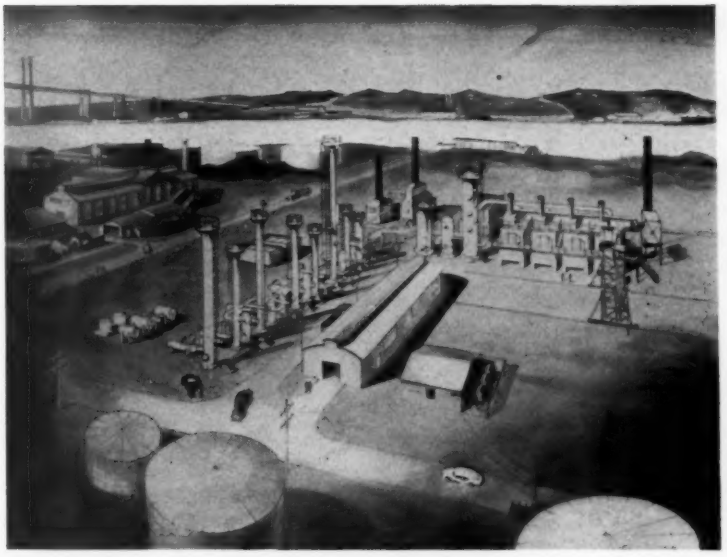
The oil is sprayed in and cracked to form a gas of high b.t.u. content, tar and carbon. The latter, instead of being in the form of lampblack, is deposited in the oven as petroleum coke, to be pushed out at the end of the gas-making period.

The gas from the ovens is rich in benzol, toluol, xylol, and solvent naphthas, which are stripped from the gas in a series of complex purifying and refining devices, and which are produced in a large quantity.

The stripped gas goes into a temporary storage holder, part of it being fed back to the oven-heating burners. The rest is fed to the present generators, to be re-formed into the utility's standard 570 b.t.u. gas for distribution to customers. The reformed gas also yields a share of by-products as it passes through the company's present recovery plant.

In the old plant production of 1,000 cubic feet of gas requires processing of approximately 10 gallons of oil. In the operation of the new plant about 11 gallons of oil will be run through in obtaining 1,000 feet of gas. The result will about double benzol production, which has averaged 1,500,000 gallons in recent years; and will add more than 500,000 gallons of toluol as compared to a minor output; as well as produce more than 600,000 gallons a year of xylol and solvent naphthas. Tar roadbinder will be doubled in quantity and the production of about 21,000 tons of petroleum coke is expected. The new plant will give a needed increase in daily gas capacity to 35,000,000 cubic feet.

* *See American Gas Journal, December, 1937.*



This drawing shows how the $1,500,000 chemical and gas manufacturing plant of Portland Gas & Coke Co. will look and which will be in operation before long.

The coke is expected to be used in the manufacture of electrodes, required by the aluminum plants now in the northwest and by electro-chemical and electro-metallurgical plants locating along the Columbia river.

The new coke oven process of gas-making can be controlled in such manner as to yield ethylene, butylene, propylene and other versatile hydro-carbons. The future output can be varied to meet needs of new industries and foster new developments in the industrial chemical field.

Many of the special products have direct connection with national defense. The electrodes, the motor fuel, the ethylene compounds useful in liquid-cooling of airplane engines and for engine anti-freeze mixture in addition to the prior mentioned toluol, useful in manufacture of TNT and other high-power explosives.

Primarily the utility is interested in the products useful at all times, and not only for national defense, which go direct to meet the needs of existing industries or else contribute to the establishment of new businesses or industries.

A large salt company is establishing its plant near the utility's site in order to facilitate the tying-in of the products of the two. The microsulphur produced by the gas company is the basis of a special line of insecticide dusts, very useful in the control of pear and apple diseases and pests in the northwest. This sulphur is much finer, more powdery and is excellently suited to dusting purpose.

Also there are amazing developments in these days of plastics. The xylol and other solvent naphthas made by the utility are needed in that industry. The future points to many more industries which will depend on the by-products made by this utility's new chemical plant.

If one were to seek a word to explain the development of the Portland Gas & Coke company, that word would probably be: "Necessity". Again proving that necessity is the mother of invention. The company had to meet the competition of cheap electricity and cheap fuels. It has, effectively, by turning handicaps into assets.

Highlights of the history of the Portland Gas & Coke company date back to 1859, when the Oregon territorial legislature granted a franchise to the founders shortly before Oregon was admitted to the Union. Ironwork and firebrick for the original works were brought around Cape Horn in sailing vessels, and first gas was made in 1860 from Australian coal. Mines on Vancouver Island, British Columbia, were also an early source of coal. Initial rates for gas lighting were $10.00 a thousand cubic feet. For domestic house heating, the company now supplies gas at as low as 25c a thousand.

First recorded use of gas for other than lighting was in the late '60's when the city of Portland arranged to use gas for keeping water hot in the boilers of its horse-drawn fire engines.

When electricity came into use for lighting the market for gas appeared seriously threatened, but this devel-

opment was met by opening up the cooking and water heating field, and later the house heating field.

In 1906 the Portland utility called Hilmar Papst from San Francisco to convert its plant from coal to oil gas operation. Mr. Papst had aided in the similar change-over in plants of Pacific Gas & Electric company in the bay area. With him came Elman L. Hall, young Stanford graduate engineer who now heads the production division as vice-president and chief engineer.

In 1910 the common stock of the enterprise was acquired by American Power & Light company, unit of the Electric Bond and Share company system. With new resources of capital opened by the New York connection, plans were drawn up for a wholly new plant on the banks of the Willamette River, several miles downstream from the city in an industrial area.

This plant was completed in 1913 at a cost of about $6,000,000. Designed for efficiency, it at once captured and has consistently maintained a position of leadership in the manufactured gas industry.

In the old plant, lampblack was virtually a waste material. Its only use was as fuel for the plant's boilers. In the new plant, this material was briquetted under high pressure and put on the market as an all-carbon solid fuel for domestic heating. For plant steam, the new set-up utilized waste-heat boilers operated in connection with generators.

Recovery of benzol was started in 1923 with the construction of a light-oil recovery plant. This material is taken from the gas by washing it in a spray of absorbent oil as it is forced through tall towers.

With highway development proceeding rapidly in the 1920's, the company then turned to the conversion of its tar to a suitable road surfacing material and developed a large market.

Benzol was put on the market in the Portland area as a blend of gasoline to give a quick-starting, antiknock motor fuel. The company pioneered this market and later contracted to sell its benzol output to an oil company, which has many more retail outlets.

Net profit from the sale of by-products has always gone into the company's operating revenues, which has the effect of giving gas users the benefit of this phase of the business. As a publicly regulated utility, the company is entitled only to a fair return on its investment. Thus, if by-product profits boost net income above what regulatory commissions consider a fair return, gas rates are cut to hold the return in line.

Actually, however, gas rates in the area served are currently regulated by the intense competition of other fuels or services and the problem is to build earnings from by-products to offset results of selling gas at below-fair-return rates in order to hold and develop the gas end of the business. So today, the utility, serving 87,000 customers in northwestern Oregon and southwestern Washington, employs 700 people with an annual payroll of about $1,250,000.

Briefly this means: Oregon and Washington people will enjoy low gas rates—among the lowest artificial gas rates in the United States. What it means to industry is benzol for motor fuel; toluol for solvents and explosives; petroleum coke for aluminum furnace electrodes and many other essential things—all of which came from what once was regarded as a handicap.

The Opportunity of the Gas Industry to Help Our Country and Itself in These Days of Great National Emergency

By
Paul B. McKee
President Portland Gas & Coke Co.

THERE ARE PEOPLE in this country who seem to think that for some mysterious reason there will always be a United States, no matter what they do or how they act. The politicians of France had that belief and sat complacently playing their petty politics behind the Maginot Line while their conqueror was busy building for their destruction. Many people in this country are today flirting with the destiny of our country, believing that our Maginot Lines, the Pacific and Atlantic Oceans will protect us, regardless of what we do. This seems to be the attitude of peanut politicians; it is true of some shortsighted businessmen and also of some irresponsible labor leaders. Fortunately, we of the gas industry, from the office boy up, are not of that ilk. We recognize that our first duty is to help our chosen leaders make this country ready for the greatest struggle of its history. We may not always agree with the point of view or the attitude of those leaders but they are the men upon whom we have placed the responsibility for leadership and to avoid chaos, we must follow them in their efforts to prepare the country for the oncoming struggle. I do not mean to say that we should sit by complacently and accept without protest, decisions or actions which we believe are inimical to the country's interest. We still live in a democracy. We are prepared to fight, to give our lives and our substance to the defense of that democracy, and it is our right, in fact it is our obligation to make ourselves heard in opposition to policies which we believe to be unsound.

In my opinion, the great opportunity of the gas industry and in fact, of the utility industry generally, and beyond that of all business and businessmen is the opportunity to set the example of broadminded effort in the interest of the whole community. This is a country of tremendous area, of large population, of complex social and political and economic problems. Each of us cannot expect to solve all of these problems, but as charity begins at home, so does our opportunity for service begin at home and what each of us does in our own sphere of activity in our own community and with our own company will add up to a sum total of national accomplishment that will have an effect on national trends. What should we do to so conduct ourselves that we will set the kind of example which will bring the best results? Every one of you gathered in this room is a leader. If you were not, you would not be here. Each of you, through the force of your intelligence and personality has more influence than you probably realize upon people with whom you come in

From address presented at the Northwest Conference, Pacific Coast Gas Association, Portland, Ore., June 9-10, 1941.

contact. What you say and what you do individually and collectively is most important. I, for one, realize that responsibility. I realize that what I say and what others say at this conference may have a great bearing upon the interests of the community in which I live and the company which I represent and when I say company, I am not speaking in the cold blooded abstract of corporate organization; I refer to the partners for whom I am working, more than 5,000 security holders, more than 700 employes and their families and more than 85,000 consumers of our service. Many of you in this room represent companies of far greater stature, with far more customers and far more employes than our company has. Therefore, your responsibility is even greater than mine.

When I realized that I was to speak at this conference, I made up my mind that these times call for more than a mere welcoming speech which would stress the importance of this and that type of effort toward the solution of our own individual problems and that to say anything worthwhile would necessitate consideration of what we and the industry may do to help the country and ourselves in this time of emergency. I have been asking myself the question "What can we do to be most helpful?" I wish I had had an opportunity to talk with each of you prior to the opening of the conference in order that I might get the benefit of your thoughts in this direction. I am still asking myself the question and I do not profess to have arrived at all the answers. I hope that later discussions in this conference may develop at least some of the answers and as a basis for discussion, I should like to place before you a few thoughts of my own which perhaps may at least provoke discussion and consideration.

Obviously, our first job is to render service. We must maintain the physical properties of our companies in first class operating condition. This will not be easy. Material priorities are now in effect with respect to every piece of steel, every pound of cement, and every bolt and screw and nut which we need to purchase. Only last Thursday I sat in the office of the Priorities Division of the O.P.M. in Washington and heard many discussions as to how to establish a priority system, not only with respect to plant extensions but with respect also to materials needed for essential maintenance. This problem has not yet been solved, but judging from the very splendid and business-like approach which the Office of Production Management is taking in regard to all problems of this nature, I have no doubt that they will be solved.

We must maintain the morale of our organizations in the face of increasing excitement and uncertainty. The job of handling an organization to carry on routine service work will not be easy in the present atmosphere. We must exert all proper efforts to convince our people that the work they are doing is essential and must be carried on, no matter how humdrum it may seem to them at the moment. No matter what sacrifice or how much work it may require, it must never be said of the gas industry that a single essential application for service has not been met promptly. In fact, it will no doubt become our responsibility to assume burdens of service which are now being cared for otherwise. This is not only a responsibility but also an opportunity. If we deal with this matter unselfishly and with a broad-minded point of view, many customers now using other services will remain with us at the end of the emergency because they will find that our gas service is the best service, in spite of any propaganda to the contrary.

Next, we must keep our companies solvent. Each of us is faced with a substantial payroll that must be met at least twice a month. Each of our companies is carrying a large and ever increasing burden of taxation. Within the next year or so, this tax burden will no doubt be greatly increased. Funds collected by local, state and Federal governments from individuals and companies are the lifeblood of our national effort for the defense of democracy. We may not enjoy the idea of having to work harder and harder to pay more and more taxes but nevertheless, we must do it. Our government cannot exist in normal times without revenue from taxation; in a time of national emergency, it is essential that the tax income of the government and its sub-divisions be maintained. We have the right to ask that the government use this tax money judiciously and that non-essential government activities be curtailed just as we shall have to economize in order that we may be able to meet our tax burden.

We must use our intelligence and the day and night working hours which are available to us to earn or save enough income to pay a reasonable return upon the capital which has been entrusted to us. We of the utility business cannot benefit from any possible war profits. In peace and war we are obligated to limit our earnings to a modest and fair return upon the capital invested; but it is essential that we earn a fair return. As it is essential to us as individuals and to our companies, so it is also essential in the interest of national defense. Our war effort demands that we maintain our home economy on a sound basis. Without that, we would be faced with internal collapse and a country in a state of collapse cannot support a substantial military program.

What I am trying to say is that we are in a state of national emergency and the way for each of us to do our bit to be helpful is to do our individual job unselfishly and without stint of effort or time or energy. A successful company and a successful industry doing its job in 100% fashion contributes to a maximum extent to the national effort and to the national morale. The poorly operated company or one in financial difficulties which must be, for one reason or another, bailed out by the government is a burden rather than an asset to this all-out effort for national defense. The fact that our government officials agree with this point of view is evident from Frank Taylor's article in the last Saturday Evening Post describing Henry Kaiser, "The Number One Builder." Why did the government turn to Kaiser to construct nearly a billion dollars worth of defense material? Simply because he is successful and has an organization that knows how to get results. And so it is up to each of us individually and through his company, to get results in our own game. Fortunately, we of the gas industry are rendering an essential service and one which cannot be stopped during this emergency but which should be augmented.

In discussing these matters specifically, one must fall back on his own experience and his own detailed knowledge. Therefore, you will pardon me if in turning from the general to the specific, I use our own company as an illustration of what I have in mind.

We believe that a public utility company like ours can build morale and good feeling in the community through careful attention to detail. It seems to me that is more important under present emergency conditions than it has ever been. In discussing this matter of public relations, I have tried to make it clear that good public relations depend not upon some high priced public relations expert but upon the manner in which individual member of the or-

ganization carries out his or her particular function. If an artist desires to paint a landscape masterpiece he does not stand across the room and throw buckets of paint at a canvas. What he does do is to prepare a careful drawing and then with meticulous attention to detail, places one small spot of color after another upon the canvas until finally a beautiful landscape appears before the eye. So it is with public relations. It is not a back slapping, loud talking type of effort but one which requires of each service man, of each collector, of each accountant, and especially the executive officers, a proper attention to service detail. It seems to me that today more than ever is this important. Picture in your mind for the moment a family living in a state of uncertainty for one reason or another. Perhaps, a boy away in the army or someone sick in the household. A meter reader or a collector comes along, does his job with intelligence and interest and human understanding and perhaps that family has received a by-product of its gas service through a word of encouragement from one of our people. I am looking forward with interest to George Mackenzie's description of the effort which he and his associates are making to improve our contacts over the telephone. This is just one of the little spots of color which make for the beautiful canvas. I believe that at this time, this type of effort should be made even more intense and should be even more carefully handled than under normal circumstances because we may be able to contribute something to the general welfare as well as to the future destiny of our own company.

I know that Jack Winn is going to tell you about the very severe competition with which our company has been and is faced. He will, no doubt, say to you that he has been at times discouraged with the lack of gravity business which has come to us in these years during which the "sword of Damocles" raised by government subsidized competition has been hanging over our heads. He will no doubt also tell you that he and his associates, with the help of our manufacturer and dealer friends and with the help of the great program of national advertising for which Mr. Pollard, (who is with us today) has been in a large measure responsible, have been able to meet that competition face to face and head on. We must give thanks that we live in a country where sales effort is accepted as a proper effort in this time of emergency and where continued work to sell a necessary service or product or idea is a patriotic privilege and duty. We propose to continue and augment this sales endeavor to the extent that we have the means with which to do it because we who know the facts know that to do so is in the best interest of all concerned.

We have a motto in our company and every member of the organization is urged to think along the lines set forth in this motto. It is to turn every possible liability into an asset and in line with that thinking, Mr. Hall, our vice-president and chief engineer, and his associates have worked and slaved day and night for the past several years to find ways and means to produce additional by-products, which in turn would supply us with additional revenue, which in turn would enable us to meet any tax free, government subsidized competition with which we might be faced.

Dealing as we do in the gas industry with combinations of carbon and hydrogen atoms, these developments will place our company in the front rank of producers of national defense material. After all, toluol, the last T in TNT, is nothing but a hook-up of carbon and hydrogen atoms. As most of you know, toluol now comes out of our gas as a by-product and more will be produced when our new plant now under construction is completed. Carbon extracted as a by-product in the form of petroleum coke is one of the essential ingredients in the manufacture of the important metal, aluminum. And so we are geared to national defense, not only because we supply an essential domestic service, "Keeping the home fires burning with a clear blue flame," as it were, and keeping important industries supplied with heat for necessary manufacturing, but also because the by-products of our gas business include coke and toluol and benzol and other essential war materials. So each time a domestic customer cooks a meal or heats her home, she has made it possible for us to produce increased amounts of these defense materials, and interestingly enough, the raw material from which both our gas and by-products come is a heavy oil from which all the ingredients useful to the oil refiner have been extracted. This is a long and interesting story and I should like to talk to you about it all afternoon but I have not spoken of it for the purpose of impressing you with our diligence or our engineering ability but merely to illustrate my belief that there are many undiscovered opportunities in this industry and to urge that each of us look for those undiscovered opportunities not only for the purpose of improving the service and earning capacities of our companies but also to be helpful in the national defense effort.

So in this conference I hope we will discuss ways and means of maintaining our present high standard of service and of improving upon it in every possible manner. I hope we will discuss sales problems with the realization that now is the time to sell even more diligently than we have ever done before. Again it is my firm conviction that this is in the interest of the nation because we have the capacity to supply more service and can thus free other materials and other types of service for use in other directions. I urge that we all look over our production and distribution facilities to determine how many additional ways they can be made useful in the defense program, both directly and indirectly. I hope that we will all impress upon every member of our respective organizations the fact that they are rendering an essential service, that they should so conduct themselves from day to day that they will help to maintain the morale of our people during these uncertain times. "Heads Up, Chins in the Air" should be the standard. This is no time for doubting Thomases, either with regard to the future of our business or with regard to the future of our country. If those of us who bear management responsibility think that we have been working hard during the past few years, we should realize that what we have done is but a fraction of what we will be called upon to do. The days ahead will not be easy days but they will be interesting days. They will be full of problems but also full of opportunities and as we strive and struggle we will have the satisfaction of knowing that we are doing a worthwhile and essential job. Be of good cheer. We are still a free people and we will continue to be free. No aggressor from within or without can conquer a country which has the material and spiritual resources which we possess. Mistakes will be made, perhaps battles will be lost, but in the end, the American way of life will emerge victorious, leading the world into a new era of progress and prosperity. Let us be thankful that we have the opportunity to participate as members of a great industry and as citizens of a great country.

Water Heaters

(1) Designing for Monthly Service Efficiency, Safety and Easy Servicing (2) Venting

By
D. J. Hendrickson
Engineer Assistant
Citizens Gas and Coke Utility
Indianapolis, Indiana

THE THOUGHTS expressed in this paper are our own as experienced in Indianapolis; not those of the Indiana or national associations, although we believe experiences similar to ours can be found among other utilities.

None of the loads of the various types of service furnished by gas companies is preferable to that of the water heater.

It is true that many gas companies can point to, say, 75%[1] of their customers having water heaters, but the great preponderance[2] of these have side-arm heaters, many of which, being connected to tanks having furnace coils, are little used in the winter and not very much even in summer because people will get along with cold water for many minor purposes rather than bother to light the heater.

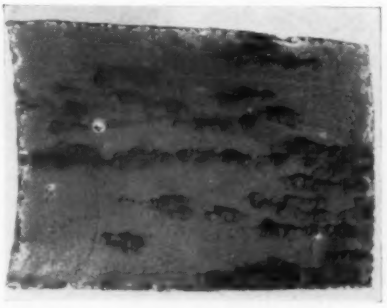
Economical, trouble-free and constant hot water service is what the customer wants; automatic gas water heating can supply these. With universal automatic water heating, our water heating gas load would probably be doubled and there are a great many customers who would be willing to pay the increased cost over that of side-arm service for the added convenience of constant hot water.

Certain troubles crop up at times with automatic heaters and this paper will attempt to point out how they can be corrected.

Usually gas managers and even engineers and scientists, talk about the percentage of the heat delivered to the water while the burner is on full, probably 75%, whereas the monthly service efficiency generally runs lower than this.[3]

The most serious trouble with automatic gas water heaters in Indianapolis, as in many other cities, is the question of service calls. There are five times[4] as many calls per year on automatic water heaters per unit in use, as there are on ranges.[5]

Automatic safety pilots, thermostats and even burner designs and drillings are of so many different types that occasionally the best experts have difficulty in diagnosing the trouble. In some cases we have put in a complete new safety pilot only to find out in a few days that the trouble was in the thermostat which, while supposed to be of the click type, was graduating,[6] now and then, thus causing back firing in the air mixer.[7]



Tuberculations on inside of water heater tank.

One difficulty in practically any automatic storage water heater is the fact that one has almost to stand on his head to see what he is doing in trying to service it, or even to light it.

When one does stand on his head to do the job, he will often have to feel around to loosen up badly corroded bolts which he cannot see but which must be removed in order to really clear the combustion passages and properly inspect the heater.

Heaters should be designed so that the service man (who is expected to complete a given number of calls) can properly inspect and repair them easily and quickly.

Proper venting of gas appliances sometimes becomes a difficult problem and poor venting aggravates the troubles from condensation which cause corrosion and the deposition of salts which clog the burners and flue gas passages of heaters. (However, regardless of venting requirements such clogging up will occur in time.)

The internal tuberculation of galvanized tanks (regardless of the type of heat that is used to raise the temperature of the water) starts immediately when the heater is put into use. No matter what kind of water or what temperature, (although temperatures above 160° F. tremendously accelerate tuberculation[8]) rusty

---

Paper presented at the Spring Meeting, Indiana Gas Assn., French Lick, Ind., May 12-13th.

(1) In Indianapolis 78.59%.

(2) ibid six out of seven.

(3) See "Crossroads," John Wood Manufacturing Company, p. 39.

(4) "Trends in Service Practice" by Andrew W. Johnston, Jr., Gas Age, March 2, 1939.

(5) The Citizens Gas and Coke Utility analyzes all service calls on all appliances. Cases in which there are more than two calls in 60 days on the same appliance are reported to the higher executives of the Utility and are turned over to a "specialist for correction."

(6) About 400 click thermostats were checked after not over two or three years use. A large percentage were found to be graduating.

(7) In Indianapolis part of the session of each of our daily schools for fitters and customers' service men (six different men each day) is devoted to water heater troubles, regardless of what the special topic for the session may be.

(8) Experience covering life of tanks in one situation (has very pure water) when connected to range coils only 20 years.

When connected to range and furnace coils, furnace fire box of ample size, no excessive firing, 15 years.

When furnace is too small and excessive firing is necessary, 10 years.

When oil is the fuel and water temperatures approach boiling point, 7 years.

When water gets up to boiling point frequently, 1 to 6 years.

When water gets up to boiling point regularly, less than 1 year.

water may be the result. Quite often, in a single year's time a tank cut in two will show thousands of tuberculations like loosened finger nails with gouged out spots under them. Sometimes these tuberculations are ½" high. Tanks fail in less than a year on some heavy duty installations, (restaurants, etc.); often last less than ten years under light duty.

The liming up of tanks cuts down capacity and efficiency; some heaters have suitable clean-out arrangements for this.

Everyone is familiar with the failure of jackets of water heaters due to corrosion, yet few realize that the condensation which causes this corrosion (whether it runs down along the outside of the flue on top and soaks into the insulation or whether it is due to warm, soggy vapors leaking from the combustion chamber into the insulation), to a certain extent nullifies the insulating effect of the jacket material.[9] Simply exchanging such a heater for a new one exactly like it or replacing the insulation with dry material, may cut the gas bill decidedly.

A frequent trouble with water heaters is back firing in the mixers with resultant sooting-up. Where burner ports are properly sized and the proper B.t.u. input supplied, this is generally caused by "Graduating" action of thermostats. While snap action thermostats must be used with bunsen type burners there are actually thousands of heaters which are using luminous flames successfully with thermostats designed purposely to graduate or throttle. These thermostats are simple; whereas click-type thermostats are more costly and complicated and subject to frequent failures.

Perhaps the most important advantage of the graduating thermostat, however, is that on small draws[10] of water only a small input of gas is required and the heater therefore operates, if properly designed, like a low input heater, whereas with the click-type thermostat the gas is either all on or all off. The efficiency of any heater is greater on low input than on high input (within limits of regular design, of course); hence, many manufacturers build "low-input" or "High-low" adjustable type burner with baffle arrangements for use where recovery must, at times, be fast.

Ample flue passages for combustion products when on high input but so designed as to prevent the flow of cold air through the heater and out the stack (heater acting like a radiator carrying the heat away during the long stand-by periods) are essential.

An important advantage of the graduating thermostat on any gas burning appliance is that it prevents the sudden inflow of the full volume of gas before the products of combustion get started away, thus avoiding a possible tendency towards partial smothering of combustion.

A disadvantage of heaters using luminous flame, is that unless considerable cold air is permitted to flow through the heater under stand-by conditions, the temperature of the water will become very high, because

Corrosion of Internal and External shells of "Tea Kettle" type heater.

the minimum flame which is safe with a graduating type thermostat furnishes more heat than radiation will dissipate otherwise.[11]

For those who insist on bunsen burners this combination could be used: (1) a burner so designed that it will not flash back except on very low inputs, (2) a combination snap-throttling thermostat. The thermostat could snap on at say 10% of the rating and then graduate to the maximum. This combination has been used very successfully on other gas burning equipment and this type thermostat would be made available for water heaters if the manufacturer had sufficient demand for it.[12]

With regard to tests for efficiency of water heaters, there are so many variables in water heater testing that tests cannot be closely duplicated; in other words, single tests are not reliable. The effects of these variables are clearly shown in the relatively large discrepancies between calculated efficiencies and observed efficiencies in tests similar to ours, as made by the A.G.A. (Bulletin 9, "Fundamentals of Domestic Gas Water Heating," explains these discrepencies). We have discarded trying to calculate monthly service efficiency mathematically and make our tests over five-day periods with the number of "draws" and volumes corresponding to customer use. We average the second to fifth day's results. (We also test a standard pilot heater under identical conditions at the same time.)

As far as efficiency when the heater is new is concerned, probably no great practical improvement can be made. We have, however, designed a heater[13] which in actual use in a home, as well as in laboratory tests, has proven that the difficulties referred to above have been overcome[14] and that this heater will con-

---

(9) On test under "standard" conditions which we use, efficiency with wet insulation was only 62.8% of that with dry insulation.

(10) We estimate that 95% of the work of the heater in the average ordinary household would be done on a B.t.u. input only 20% of the rated maximum B.t.u. input of the heater.

(11) Some manufacturers actually use thin insulation on their heaters to increase radiation of heat to compensate for this!

(12) We have asked a burner manufacturer to design such a burner and a thermostat manufacturer to design such a thermostat.

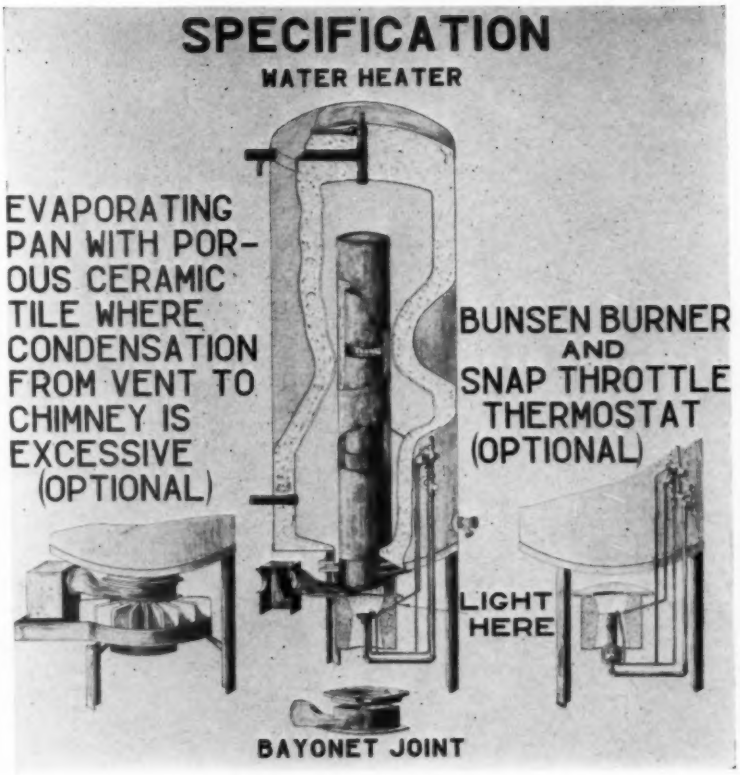
(13) Patent applied for. We call it "Specification" Water Heater.

(14) The trapping of the gases, as in a Junkers Calorimeter, is accomplished by discharging the cooled exit gases at a point lower than the bottom of the tank; operation as a low input heater for 95% of the time, yet automatically becoming high input (20,000 B.t.u. per hour for 30 gallon size) when the demand arises, by using a graduating thermostat and luminous flame. Radiation losses from the flame itself are reduced by surrounding the burner with a thick fire brick block and by using insulating material instead of a thin steel tube (which would get red hot) for the lower part of the flue up which the hot gases pass and from the outside of which they go directly to the chimney. Facility for cleaning combustion passages by having the heater stand on high legs with simple bayonet connections for fastening burner box to tank, etc., and by making the inner flue in sections easily removable. Facility for cleaning the lime from the inside of the tank by having a large bolted opening in the bottom of the heater through which the heating element tube can be withdrawn when the tank is disconnected and laid on its side right on the customers' premises. Pilot, thermostat and burner troubles avoided by using a standard electric-current-generating pilot and a simple, graduating thermostat and an aluminum burner head. Internal tank corrosion prevented by using a vitreous enameled tank. Provision for evaporation of condensation from vent which carries products of combustion away (optional). Prevention of soaking of insulation by so designing that moisture simply cannot get into it. Safety by having a perforated lighter tube for lighting from the outside without stooping and the pilot and working flames visible at all times without stooping. If the heater flame should happen to puff a little strongly when being lit, the flames will not blow towards a person's face or hands.

tinue to give high efficiency indefinitely, because its insulation will not become water soaked; its combustion passages can be easily cleaned; its lime can be easily removed, when necessary.

In connection with prevention of internal corrosion of tanks of water heaters and of flues from gas burning appliances, we have, after many tests over a number of years, (both accelerated tests in the laboratory and field service tests) decided that vitreous enameled tanks, when properly designed[15] and properly enameled with the correct enamel,[16] will last apparently indefinitely, whereas baked on synthetic gums for this purpose are valueless.[17] On the other hand, for flue pipes the baked-on synthetic gums are the best coatings, although pipes and fittings specially designed (seamless) and properly vitreous enameled and installed without cracking or spalling off of the enamel, will apparently give a long life. (At first thought everyone considers vitreous enamel practically insoluble in almost everything, yet everyone remembers the vitreous enameled wash basin where hot water dripping from a leaky faucet has washed off the enamel under the faucet!)

The Gas Industry has no great research laboratories to develop efficient appliances, although the A.G.A. laboratory has been helpful in encouraging manufacturers along these lines. The A.G.A. Bulletin No. 9 will probably develop considerable enthusiasm towards making real improvements on the part of water heater manufacturers and manufacturers of accessories used for water heaters. For designers of water heaters, this is a most valuable study.


SPECIFICATION
WATER HEATER
EVAPORATING PAN WITH POROUS CERAMIC TILE WHERE CONDENSATION FROM VENT TO CHIMNEY IS EXCESSIVE (OPTIONAL)
BUNSEN BURNER AND SNAP THROTTLE THERMOSTAT (OPTIONAL)
LIGHT HERE
BAYONET JOINT

Venting of Water Heaters

As stated before, proper venting of gas water heaters (and of some other gas burning appliances) often becomes a difficult problem. We have pretty well solved the venting question in places where down drafts are caused by exposed chimneys[18] which get so cold in winter that the weight of the heavier products of combustion (or even of the air itself in such chimneys) is greater than that of the corresponding column of warm air inside the house, causing down drafts in the chimney; or where exhaust fans for ventilating restaurants, etc., pull an actual "vacuum" on the whole building[19] or where hot, soggy flue gases cause very rapid corrosion of flue connections.

Vents on many low input heaters fail quickly, but high input heaters, under heavy loads, are the worst offenders.

Many engineers, even among authorities on ventilation, fail to remember how little a difference in pressure is required to cause a "backdraft." Conversely, many engineers imagine that a ventilating fan which pulls so hard that there is an enormous in-flow of air through a door when it is opened, must cause at least 1/10" water gauge pull on the building! Actually a back draft of

(15) The most important point is to have no sharp edges (like the right angle corner of a plate) which has been sheared off straight (say, to be lapped over for a welded or riveted joint). Such corners must be rounded off because enamel will not accumulate thick enough on such a corner to have the strength to withstand cracking and if there is the slightest crack or pin hole in enamel the job is worthless. For this reason ordinary lock-seams, crimped elbow, etc., for flue pipe, cannot be used for vitreous enameling work, but the pipe and fittings must be seamless (or practically so). Even for synthetic gums which are comparatively elastic after they are baked, we use pipes and fittings which have joints for all purposes as nearly smooth as seamless pipe. These pipes and fittings are purchased at a cost no higher than others.

(16) Since we started our tests, two manufacturers of tanks for water heaters have come out with vitreous enameling for their tanks. We think they have done the designing and fabrication properly and have used the right kind of enamel.

(17) Because they are exceedingly soluble in hot water which is even very slightly alkaline, such as may be encountered in some water supplies for domestic use.

(18) By relocating the appliance near a chimney inside of the building or by running a small flue to above the roof outside of the building, using asbestos-cement pipe or double pipe.

(19) By venting to the chimney and putting a horizontal draft diverter on the line going to the chimney near the chimney and running a branch over to the exhaust fan and dropping down to the fan with an elbow near the center of the fan pointing in the same direction as the flow of air through the fan; thus forming a trap when the fan is not running which at such times allows the products of combustion to go over to and up the chimney, or where a heater is near the outside wall, making an absolutely solid and air tight connection (twice the diameter of the flue pipe) from the outside air to the bottom of the heater, using no draft diverter, sealing the heater door, etc., absolutely tight and shutting down the ventilating fans when necessary to service the heater. (Such a connection must be run up to a point near the top of the chimney into which the flue is connected so that the same wind-effects strike it at the same instant that they strike the chimney top.) The slightest leak developing in such a connection will cause a down draft and floating flame which may extinguish the burner and pilot flames; or in extreme cases using an exhaust fan running continuously (takes about 1/50 h.p. motor on water heaters; about 1/15 h.p. motor on house heating jobs.)

.002"[20] or .003" is all that is necessary to smother combustion in many appliances. Actually the "pull" from a ventilating fan on a building's atmosphere is seldom over .02" or .03", although we have been told that it can run up to .3" or .4".

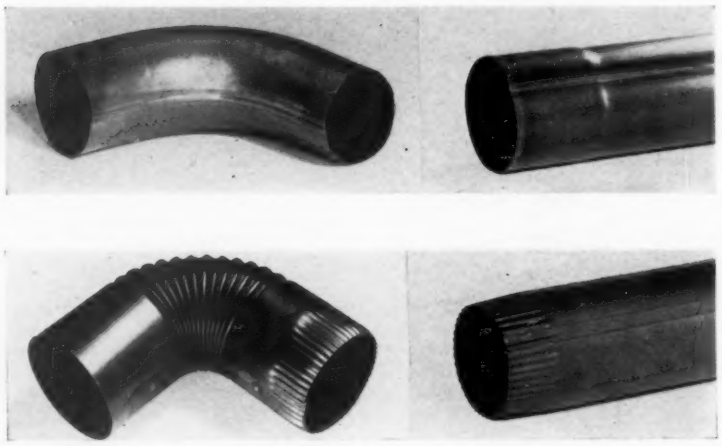
It may seem that it would take a long time to get a service test on any coating for flue pipe; however, actually there are in almost every city places where a galvanized flue pipe will completely fail in two or three months. We have chosen the worst of such places and made tests on them covering some years.

Failure after 85 days use of pipe coated with "Acid Resisting" Paint compounded especially for flue pipe protection.

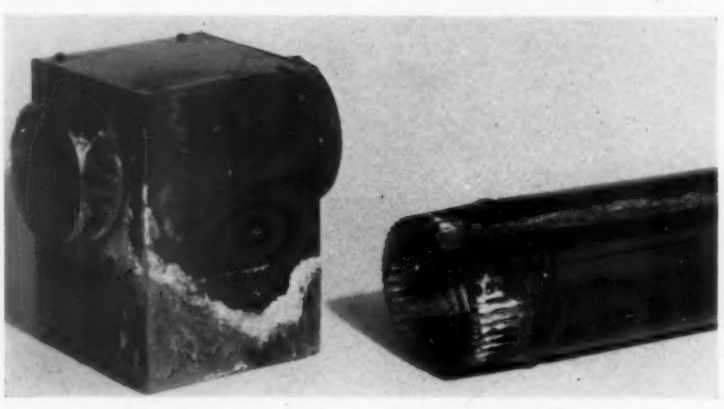
We soon threw out platings (on steel pipe and fittings) of lead, copper, cadmium, etc., but we proved to our own satisfaction that copper (either lead coated or plain) and the silicon bronzes and asbestos-cement products will give a very long life. However, all these are exceedingly expensive (about four to five times as much as galvanized materials). Aluminum gives very long life but it also is very expensive; anyway it is almost impossible to get aluminum now.

We therefore determined to try out various coatings of paints, synthetic gums (baked at about 300° F.) etc. We have tested and discarded a great many of these, but have found that certain synthetic gums, when applied with three or four coats (each coat baked separately at just the right temperature to pipe and fittings properly designed as to joints, etc., and which have been thoroughly cleaned), give a remarkably good product. Except for the cost, which is also high, this would be the answer. However, with a view to getting really very low cost, we have gotten from one of the best known manufacturers of paint and enamels, an actual paint (synthetic gum base) which is applied only two coats and simply air dried; this paint appears, from accelerated tests, to be very promising and will give a low cost finished product (about twice that of galvanized material). Our service tests on this coating will not be completed for some months yet.

As in the case of a lining for water tanks, we have located a vitreous enamel (acid resisting type) for flue pipe, which, when applied to just the right kind of surface, appears also to be very promising. The cost to us of pipe and fittings so enameled is not more than twice that of galvanized pipe and fittings. (Almost all other enamels fail very fast—some as quickly as galvanizing—and where the seams have any kind of a lap or sharp edge, these do not take the enamel, regardless of its kind, with the result of very short life at such seams. Unfortunately when baking vitreous enamels, the high temperature (about 1650° F.) causes the pipes and fittings to warp badly out of shape. In addition to the great difficulty of fitting together shapes which are out of round, such



Upper: Pipe and fittings suitable for coating have narrow lockseam and bells for joints. Elbow made without crimping. Compare with wide seam and crimp joint type, below.



Corroded vitreous enameled pipe and down draft diverter. Ordinary vitreous enamel after 6 months use.

	MATERIAL	INSTALLATION COST	TOTAL	% GREATER THAN GALV.
Galvanized	$ .67	$ .69	$1.36	....
Cement-Asbestos	2.98*	.76	3.74	175%
Silicon-bronze	3.12	.76	3.88	185%
Synthetic gum Coating—4 coats baked	1.88	.76	2.64	94%
Synthetic gum Coating—2 coats air dried	1.56	.76	2.32	70%

* *Since the chimney sleeve and the diverter are not furnished in the cement-asbestos products, silicon bronze was used.*

(20) To emphasize how small a thousandth of an inch is, it takes a thousand sheets of the thinnest tissue paper, piled closely together, to make about one inch. Such exceedingly small differences in pressure cannot be measured at all except with very special gauges. (The A.G.A. has developed a micromanometer for pressures on the order of .0002".)

(21) In order to obtain a comparison of the costs of various types of materials and coatings, a typical connection (consisting of a 12" piece of pipe from the appliance, a 90° elbow, a 12" piece of pipe, a horizontal draft diverter, 24" of pipe and a 12" sleeve into the chimney) was taken.

care must be used in handling and fitting vitreous enameled materials to prevent cracking or spalling that they appear to us to be impractical as compared to the tough elastic synthetic gum coatings.

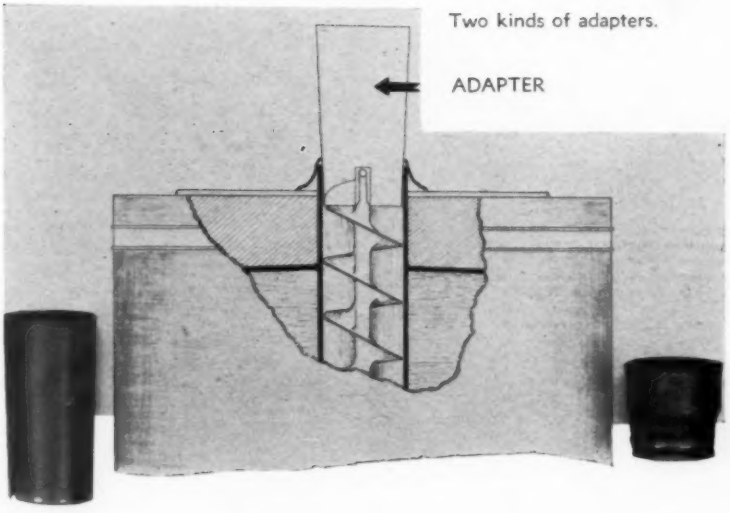
There is one company which has on the market a very good line of baked on synthetic gum pipe and fittings; another company which has a very good vitreous enamel line.

The labor for erecting coated jobs is only a few cents per job more than that for galvanized material. The cost for material and labor together is only about $1.00 to $1.50 more on the average water heater flue (for 20 and 30 gallon size heaters). At present we are using coated pipe and fittings wherever we have reason to believe that galvanized material would fail within the guarantee period on the heater (one year) even though the baked synthetic coating jobs cost about twice as much as galvanized jobs (but only about half as much as with copper, cement asbestos materials, etc.).[21] We use a gray color, similar to that of weathered galvanized material, or actual aluminum color, for all paints, synthetic gums and vitreous enamels. (In some cases only the finishing coat is gray as base coats of other colors are claimed by the manufacturer to give longer life, although we have had no failures with gray color.)

Vertical draft diverter with funnel and adapter built in.

Because of the desirability of doing away with crimps, we use a bell joint.[22] All joints are cemented tight with acid resisting cement which we purchase in bulk and put into collapsible tubes. Pipes are sawed off with a hack saw, the pipe being held in a round hole in a wooden block.

Horizontal[23] draft diverters are used wherever possible, but where vertical draft diverters must be used they are provided with a funnel to catch any drops of condensation. This is piped off from the top of the heater. The connection from the heater to the diverter is made very short so that practically no condensation can form in it, but even for the occasional drop of condensation at this point from the fumes when the pilot alone is burning, there is an adapter[24] used to prevent this drop of condensation from getting into the insulation at the top of the heater (by causing it to run down into the flue; if the amount of condensation allowed to run into the flue were at all considerable, the salts from it would soon clog the flue, especially where retarders are used).



Two kinds of adapters.

It is against the law in Indianapolis to permit water heaters to operate without proper vents or with vents that have become defective, yet occasionally vents are installed where the conditions are such that they fail in a very short time. Probably 5% fail within a year and by five years 20% are in bad condition.

We aim to attach red warning tags (probably four-fifths, however, being on side-arm heaters) to heaters having defective vents, and to follow through where they are on automatic heaters to see that the vents are renewed. By pricing our heaters installed a few dollars higher we could use materials that would always give a long life. Would we, to save a few dollars, use materials for gas piping that would fail as quickly?

A practice which we have found helpful in cutting down the cost of heating water is the use of small copper tubing to replace unnecessarily large hot water piping as recommended by Prof. Krappe of Purdue University.[25]

(Concluded on page 44)

(22) Although we have found that for the paints or synthetic gums, crimp joints could be used, but not for vitreous enamel.

(23) A back draft on a vertical diverter, if very strong, will hold back the products of combustion coming from the heater and smother the flames; with a horizontal draft diverter it will not do this.

(24) Even one drop of water an hour getting on to the top of the heater and running in between the flue connection coming up through the top of the casing and the casing itself will soon saturate the insulation—it never dries out. In a short time the top casing and the upper part of the side casing of the heater will be corroded away. The adapter fits at its bottom inside of the flue itself, coming up through the heater, whereas the elbow going over to the horizontal diverter (or the straight bottom connection of the vertical draft diverter) fits inside of the adapter; if the diverter happens to be so placed that drops of condensation from it would fall on to the heater, it is provided with a bend to carry the condensation to one side where it will drop on the floor (or into a funnel with a drain if dropping on the floor would be objectionable).

(25) Report on use of small size tubing insulation and traps in the hot water pipe system by J. M. Krappe, Associate in Gas Engineering, Engineering Experiment Station, Purdue University, West Lafayette, Indiana.

THAT DEMONSTRATION PAYS

Planning Merchandising Campaigns

By
H. W. Edmund
Sales Manager, Coast Counties Gas & Electric Co., Santa Cruz, Cal.

THERE ARE two methods of campaign planning ordinarily used by utility men responsible for sales. These methods may be compared with the manufacturing systems employed by producers of men's clothing. The first classification includes the ready-to-wear suits—the second bracket embraces the tailor-made variety.

Results are comparable also. Ready-to-use plans as ready-to-wear suits may be inexpensive and easy to slip into and may give excellent satisfaction. They may also be just the reverse—poorly fitted to the problem at hand and directly reflecting the lack of thought in selection and application.

The ready-to-use type includes current national promotions such as the annual Refrigeration Campaign, the CP range contests, association sponsored activities of all sorts. It may also apply to campaigns used previously by other utilities or other lines of business or stock plans prepared by advertising agencies, sales service companies and manufacturers. Lots of material is prepared each year that is suited for conditions in the Middle West and East but not to the Pacific slope. For example, eastern heating campaigns make capital of the nuisance of ashes and attendance necessary for coal. Display advertising features basements and snow. This is all wasted effort as far as most of us are concerned—as useless as was the campaign conducted some years ago in southern California newspapers for an anti-freeze compound for automobile radiators.

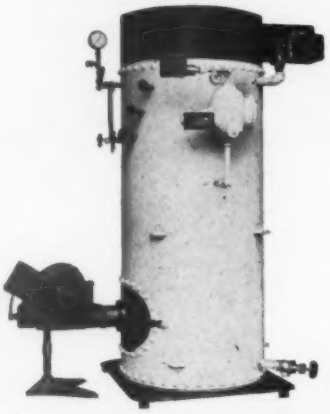
Now about the made - to - measure type of campaign. The sort of campaign where we survey and check figures and prepare all details with great care. Why should there be any question as to the success of this sort of campaign? If we know our problem certainly we can plan directly for its solution but let us review some of the difficulties encountered that threaten the campaign's success.

1—Survey figures may be misleading and erroneous deductions made. The importance of accurate surveys and correct interpretations of data thus gathered is appreciated now to a greater extent than ever before. First-hand knowledge of the sales territory is essential to the planners—surveys should be the agency through which the planners obtain this consumer information most effectively.

2—Too much time may elapse between planning and doing. The necessity of programing a year or more in advance is usually a budget provision but budget allotments and long-range forecasts should not be expected to include detailed campaign plans. Prompt execution of ideas is necessary if the campaign is to fit in with such variables as the weather, local business conditions, market prices, availability of merchandise, and national emergencies.

3—Too much selling effort is necessary with executives within our own organization.

LATTNER
GAS — OIL BOILER
3 HP to 35 HP.



Burns natural gas or regular furnace oils with equal efficiency.

P. M. Lattner Mfg. Company
Cedar Rapids, Iowa

Most of our sales executives are sales engineers—we are not really salesmen in that we create a desire to buy where no desire now exists but rather we try to find an application for gas in a customer's home that is now being filled by a competing fuel. If we are convinced that the customer really needs our product and can afford to pay for it we go ahead with vim and vigor—but our consideration for our customer's welfare often results in a dealer more selfishly inclined selling Mr. Customer an oil heater at twice the price of a gas heater and an electric refrigerator two sizes larger than we thought he needed.

Another thing is the desire on the part of the engineering mind for certain guaranteed results. Will you produce *blank* business if we spend *blank* dollars? Why expect a guarantee? Very few other merchandisers feel that there should be *no* element of chance in sales promotion work.

If executives would adopt the "how can we make it work" attitude toward sales plans rather than the "this won't work because . . ." frame of mind, they would release a reservoir of energy for constructive selling that is now used up in overcoming internal sales resistance.

4—Too much consideration in planning is given to pressure dealer groups and associations and not enough consideration to friendly dealers and suppliers who do not complain of our activities. We should consider all angles in the effect on dealers.

The four difficulties mentioned are overcome or compromised and the made - to - measure campaign reflects the tailor's handiwork. So much for small-town planning.

May I say a word in closing about the type of campaigns I have found to be most effective. I call them product or basic campaigns because they are aimed to sell the use of gas through any and all appliances. Our free gas campaigns were of this category. They were most successful. Another was the gift certificate plan wherein a certain rebate on the customer's bill was good for payment on any gas appliance at any dealer's store. This type of campaign is all-embracing and I recommend it to you if you can use it.

Seminar on Holding and Developing Business, Northwest Conference, Pacific Coast Gas Association, Portland, Tuesday, June 10, 1941.

THE FIRST OPERATION
Without Pain
In the operating amphitheatre of the Massachusetts General Hospital, on October 16, 1846, a group of doubting doctors saw it demonstrated and proved that a newly discovered agent, called ether, could produce a blessed insensibility... to even the most excruciating pain.

941, Harper-Wyman Co.

Nothing convinces like demonstration

VITALLY important to the gas industry is the job of *showing* the public that, of all the fuels, the most efficient and economical is Gas.

Nothing does this more effectively than demonstrating the Harper Burner System... showing modern cooking at its best. Actual demonstration proves the advantages of the unique Harper "2-burner-in-1" construction . . . the time-saving speed of the STARTING BURNER... the exact boiling heat of the tiny, economical COOKING BURNER . . . the accurate *control,* the unequalled *range* of heats, made possible by the patented and exclusive double-burner principle.

Let your customers see the Harper Burner System in action, and most of your selling is done! They are convinced of the superiority of the modern gas range . . . and of Gas as a fuel.

DEMONSTRATES THAT "GAS DOES IT BEST"

HARPER
BURNER SYSTEM

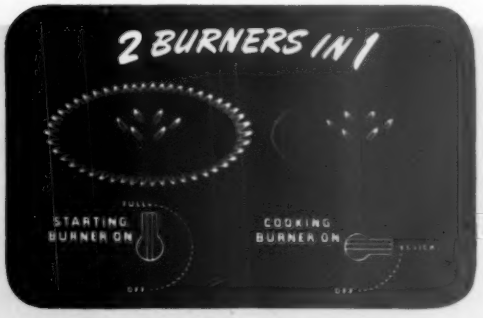
TURN THIS PAGE FOR PROOF THAT DEMONSTRATION PAYS

Sell the advantage of *"Absent Cooking"* by this simple demonstration

Turn on the Harper COOKING BURNER and let your customers see its tiny but exactly-measured boiling flame. Explain that since this flame is always the same—unvarying—it always takes it *more than an hour* to boil away a cupful of water in a covered vessel. Tell your customers that if they use a cup of water, then, for *each hour* of absence, their foods will cook unattended without danger of burning. Explain that *absent cooking* thus saves many women 8½ hours of needless kitchen time *every week.*

Also demonstrate the *safety* of absent cooking. Blow out the flame and let your customers see how, if it *should* be blown out by a sudden gust or current of air during their absence, it would immediately relight, automatically!

THIS FREE BOOKLET: "How to Sell More Gas Ranges," contains a series of quick, convincing sales acts planned to dramatize the truth about the modern gas range. Send for copies for your salesmen. *Harper-Wyman Company, 8562 Vincennes Avenue, Chicago, Illinois.*



The Harper Burner System operates on the unique principle of "2 burners in 1" . . . a* STARTING BURNER *plus a small, economical* COOKING BURNER, *both controlled by the same handle. It is subject to finer gradations of low heats—greater control and economy—than any other cooking unit made.

CHARLES TISCH INC.
Distributors of
ELECTRICAL GAS COAL & OIL APPLIANCES
A Source of Quality
NEW YORK SHOW ROOMS SUITE 333 101 PARK AVENUE NEW YORK CITY PHONE MURRAY HILL 5-6333
102-07 ROCKWELL PLACE BROOKLYN, N.Y.

February 6th, 1941.

Harper Wyman
8562 Vincennes Avenue,
Chicago, Illinois.

Gentlemen:

As distributors of several of the leading ranges we have had considerable experience selling ranges equipped with Harper burners. One of our functions is to demonstrate to our dealers and customers.

Our most effective means of "Selling Up" to better price ranges is by demonstration of the Harper burners hooked up with the one cubic foot meter.

This visually and conclusively brings out the number one appeal of Harper burners which of course is economy with maximum effectiveness.

Yours very, truly,
CHARLES TISCH INC.
Vice President

CTJr:mb

Proof That Demonstration Pays

HARPER BURNER SYSTEM

—one of the standards of top burner performance under Cp

Some Reflections and Observations On Accounting

By
Hall M. Henry

Assistant to the President,
New England Gas and Electric Association

HALL M. HENRY

MANAGEMENT has too long taken the attitude that accounting was something for the Accounting Department only to worry about. I feel, however, that the time has come when the Accounting Department must take a more active part in the advancement of the gas industry. You men are the historians of our business and your greatness (as is the greatness of any historian) is determined by how well you record and *interpret* the historical facts to Management. It has been my observation that most Accounting Departments are already doing a good job in recording the facts and presenting from time to time critical observations of departmental expenditures and this critical attitude is more than welcomed by Management. There should be more of it, but Management needs to assume some responsibility for the correct interpretation by presenting a measuring rod for the accounting men. However, I am afraid that due to an improper measuring device these critical observations arising from a study of figures which, while in themselves are important, do not reveal the true facts. Let me illustrate:

A good many years ago I was associated with a group of companies in the Middle West. Many of the companies in this group had never maintained a New Business Department. Naturally when the sales organizations were enlarged, and more money appropriated for sales and advertising, the New Business expenses increased. At the end of about a year the head of our Accounting Department and Treasurer severely criticized the New Business expense to the President of the Company and to make matters worse it so happened that our gross revenue declined during this year, thus from this Accounting officer's viewpoint we had increased our New Business expense (I believe it was $60,000 annually) and yet our gross revenues were decreasing so—why spend money on New Business. This was a logical conclusion based on the "figure facts" at the disposal of this accounting officer. However, by making a study of the actual bills of a certain group of customers before and after the New Business program was launched it was found that the new loads added amounted to some $200,000 yet our total gross revenue had declined. It doesn't take much figuring to show the company was justified in spending $60,000 to get $200,000 of increased revenues. Had our President acted on the "accounting figure facts" as presented by the accounting officer our New Business revenues would have been curtailed, but confronted with the complete facts he authorized an increase in expenditures.

Therefore, my first *general* recommendation to you is to be sure you have a complete History of the facts and data before you present your critical observations and that you have a proper measuring device. Let's not be like the four blind men who went to see the elephant—and each described him in turn as follows:

No. 1—getting hold of his trunk said he was like a tree.

No. 2—hanging on to his tail said, "no, he was like a rope".

No. 3—leaning against his side exclaimed, "no, he is like a house".

No. 4—catching hold of his ear said he was like a fan.

All of these blind men were right yet all wrong. Too often have each of us when studying operating reports observed some items that seemed to be out of line based on the figures presented—only to find on further investigation (in some instances quite extensive investigating) no cause for alarm.

Uniform Interpretation

My second general recommendation is that you do something to bring about a uniform interpretation of the several accounting codes. It is realized this is a sizeable order, yet there is surely nothing more exasperating than to find some apparently less costly means of doing some operation in one Company versus another is due solely to an accounting interpretation. As for example—an interpretation which includes a compressor operating expense when the compressor is located in the plant as a plant production cost and therefore included in holder cost per M.C.F. whereas in another plant such costs are included with Distribution where they logically belong. Or take a New Business example—where we were quite perturbed over the fact that the cost of installing a House Heating Conversion Burner by an outside company was only $27.00 whereas our cost was $64.00. However, upon investigation we found the outside company did not include such items as Room Thermostat—Limit Control—Low Water Fuel Cutoff—all of which were considered part of our installation expense. We consider we are wrong—but due to a difference in classification of what constitutes installation expense—considerable time was wasted in trying to reconcile a difference of $37.00 in the two companies. Following down a few of these false trails is likely to produce a "wolf-wolf" attitude on the part of those who are now interesting themselves in following these false trails. We here in New England have a wonderful opportunity to profit by each others experiences, but can only do so provided we maintain comparable records embodying above all a uniform interpretation of the accounting code. Can the accounting section meet this challenge? I for one believe it can.

Paper presented before the Accounting Division meeting, The New England Gas Association, May 27, Malden, Mass.

Unit Cost System Needed

The next general recommendation I wish to make is that the Accounting Division in collaboration with each of the branches of our industry such as Production—and New Business—agree on the type of data which will prove most valuable in determining "unit costs" of the *various phases* that make up operations in these Departments. Our present accounting system is a "hodge podge" primarily designed to meet the demands of Regulatory Bodies —Tax Commissions and Financial Experts. It would seem that our whole accounting procedure might well be reviewed from the angle of "cost accounting". In the successful manufacturing plant you will find two types of accounting—one the so-called corporate, financial or general or whatever name you want to give to that accounting which tells in general figures how much revenue and how much expense, the investment in plant property, the total reserves, etc. The other and by far the most important is *"cost accounting"* which tells what it costs to do a certain operation or manufacture a particular product. Prices in a manufacturing plant are predicated on cost studies and are increased or decreased as these studies show the costs are increasing or decreasing and hence are invaluable to a manufacturing plant.

Dynamic and Static Departments

In the gas industry we do not vary prices according to "unit costs" and hence probably the reason we do not go in for "cost accounting". However, our Net Income is vitally affected by *costs* so why shouldn't we give more attention to a "cost accounting" setup. A cost accounting system need not be applied to all phases of all departments at first but only to those phases or departments of the company which can be termed Dynamic as opposed to others which we call Static. For instance the New Business Department and *all allied functions* are *dynamic*. It is usually expanding or contracting personnel — varying prices — incurring additional service and installation expenses as new and more appliances are sold. On the other hand such operations as meter reading—billing — collecting — production and distribution (exclusive of servicing and installation if these come under Distribution) are very much routine so that any major reduction in expenses must come as a result of a major change in policy or procedure—such as for instance—changing meter reading from a monthly affair to one where meter reading is done every three months—or changing accounting to the Unit Desk System or Unit Customer Service System—or to machine accounting—or changing Gas Production process to heavy oil or soft coal operation. We do not mean to imply that cost accounting is not desirable in these static operations. It is urgently needed—and particularly is a uniform interpretation of an accounting code necessary so comparisons can be made between companies. What we wish to convey is that since these operations are static there is not the possibility for incurring quickly unnecessary expenses and expenses which may be out of proportion to the value received as is the case with New Business and its allied operations.

Costing of Static Operations

In the so called Static Operations it may only be necessary to establish the *basic records* so that a costing can be made periodically. It might well be for instance on such phases of the Distribution Department as Meter Maintenance—that the meter cost records would be summarized every six months or even every year and a comparison made with other New England Companies. Perhaps the Accounting Departments of the New England Companies can agree on this periodic data and arrange for an exchange of data between companies where comparisons would mean something. Such a service would prove most valuable to Management. Similarly in the Production of Gas—there might be a periodic summary of basic cost data and exchange of data. Such a costing might as a starter take F.O.T. costs (Fuel plus Oil less Tar) with a uniform price application. Let me cite what one such comparison meant to one company. There existed a 4c per M.C.F. higher *Holder Cost* in one company vs another making same quantity of gas in same type of equipment and using same grade of oil and coke. For years this differential was attributed to a difference in freight rates and the freight rates did on the face of the figures account for a 4c differential. However on making an F.O.T. comparison using same unit fuel prices there was a differential of 1c per M.C.F. which obviously was not due to freight rates since fuel prices were taken as being the same. A closer study disclosed operating technique used in the more efficient plant which when made applicable through changes in equipment to the other plant resulted in bringing the two plants in line. This change made a $16,000 saving in costs—certainly a worthwhile saving. We are now preparing to make a cost comparison of Generator Lining Maintenance. This is a very small part of gas production costs but illustrates that small unit cost factors might well be set up so they can be readily analyzed. It would be ridiculous to report such unit costs in detail monthly but here again if the proper basic cost data are provided for in an accounting code so the basic records contain the facts needed—such a costing could be made periodically and comparisons made with comparable companies. Numerous illustrations might be given—but it is not the intent to here detail all the types of cost accounting that can profitably be employed—but merely to indicate the broad principles and leave to more detailed study and investigation the extent and nature of a cost accounting setup for these Static operations.

Costing in Dynamic Operations

In the Dynamic operation namely New Business there is need for a new concept of accounting. This department should be furnished *weekly* with a picture of its basic expenditures. For instance the Sales Manager at the close of each week should know how much has been sold—what is the total appliance profit—the total net E.A.R. added—the weekly advertising expense, and weekly sales expense and in addition—what *each* salesman sold—and what he is paid or to be paid for his sales—how much appliance profit each salesman produced—how much net revenue he added through his sales. It may be necessary to establish some unit cost figures for estimating the cost of appliances installed to use in figuring appliance profit since the installation costs may not be available weekly. It may also be necessary to apply the unit advertising costs per line inch to determine amount of advertising contracted for. However, these figures with experience will closely approximate the actual. Certainly receiving New Business figures six weeks or two months after they have occurred is like locking the barn after the horse has been stolen. We cannot expect our New Business Managers to control their expenditures and keep within their budgets unless we provide them with proper control figures and at a time when they will be useful in reducing expenditures. This does not mean that a New

Business accounting code such as was set up by your Section about 18 months ago is not needed. It is—but such a code is useful in comparing costs as between companies and in determining New Business expenses by appliance groups, over a period and when related to the results obtained in way of increased Net Revenue are quite valuable, but as a means of control they miss the mark.

Installation Costs

The installation costs of the New Business Department may well be a source of added expense unless proper and adequate cost accounting records are established. In our group of companies through a cost analysis which at first required several months time we found we were losing some $40,000 on installations yet it was the avowed policy to at least break even. Through this cost analysis we were able to critically examine our installation expense in detail and through a change in policy—plus setting up adequate prices for installation—plus holding the installation department responsible for keeping within the amount allowed—plus an accounting system which provided the basic cost factors by *appliances*—we were able the first year even with a larger volume of appliance sales to reduce our loss to $16,203 and in 1940 with largest appliance sales in history of the company to $7,455. We expect this year to break even. We can assure you that only through a proper costing analysis can any Sales Department keep their costs in line. If they do not now have one give it to them and you will be agreeably surprised at the result.

Evaluation of New Business

This brings me to a subject which has had the attention of executives for some time and in which they are vitally concerned. That is a method whereby the results produced by New Business operations may be measured. The industry cannot depend on its Gross Revenue as an index to what its New Business is producing. The average Gas Company is subjected to losses in revenue which at times exceed its gains. It therefore needs a measuring rod. At present many companies — ours among them — are using Estimated Revenue figures. Our figures are obtained by spot checking individual appliance sales determining before and after consumption figures, with interviews to eliminate increases and decreases that may be due to other causes. For instance we use the following Unit Estimates:

Basis for Estimating Results of New Business Operations

Appliances	*Annual M.C.F.*	*Average Rate*	*Annual Gross Revenue*	**Annual Net Revenue*
Automatic Water Heater	24	$0.80	$19.20	$14.40
Tank Water Heater	12	1.20	14.40	12.00
Refrigerator	22	0.80	17.60	13.20
Kitchen Heater	60	0.50	30.00	18.00
Central House Heating Installation	240	0.52	124.80	76.80

*Net Revenue based on 20c increment cost.

By multiplying these Unit figures by the number of appliances sold we arrive at our Estimated Results. Comparing these Estimated Figures with our actual net New Business expense (total expense less appliance profit) we have one method (although only an approximation) of what we are getting for our New Business dollar. Can the Accounting Section provide Management with a more accurate measuring rod for New Business? In such a study weight should be given to New Business efforts on holding the business we now have but how to do this is beyond the scope of this paper.

New Extensions

Practically every company in New England is called upon from time to time to make main extensions. In many if not all an Annual Estimate is prepared wherein is shown the cost of the proposed extension and the number of customers to be served together with the estimated Revenues to be derived therefrom. The extensions are approved on the basis of the showing made by these estimates. Should there not be a periodic accounting made to show how the actual results compared with the original, say at end of the first year, second, third, etc.? Might not such a study disclose weaknesses and if you please, strengths heretofore unsuspected?

Service Costing

In an endeavor to do something about service costs your section furnished the Service Policy committee with a Service Accounting code. Now this is a fine code since if it is properly installed and uniformly interpreted will furnish much valuable data for comparisons between companies on different types of servicing. It can, however, be valuable to the individual company even if other companies do not adopt the code and thereby make possible the comparison contemplated. For instance, if you only handle one make of range the basic accounting data can be set up to tell what particular parts of the range cause the most trouble—was it pilot outages—chipped enamel—heat control—back firing. With such data we can start to correct the evil. Or if we sell two or three different makes of ranges we can set up the servicing costs by makes. For instance one such study shows one make costs 70c per year during 1st year, another make $3.75. Is it not important to know about such differences? Does it not mean something to know that one company spends $27.00 per year per customer servicing house heating while another spends $5.00? You multiply $22.00 (the difference between the two Companies) by 3,000 heating customers, the number we now serve, and you get $66,000 which represents the difference in annual service costs for this number of customers. With such potential savings in servicing possible through action brought about by proper service cost accounting and comparisons, should we not press for continuous action along cost accounting lines and should we not establish a periodic checking of these costs to see if further savings may be possible? For instance if we made a further study of House Heating Service costs to find out what portion is due to lighting in Fall and turning off in Spring—we might find in the not too far future when it would pay us to stand the cost of substituting the electric ignition for the present system. Furthermore present indications point to a real saving in service costs if the hot water is supplied by the heating boiler thereby eliminating the necessity for either lighting or shutting down or even cleaning the boiler. Furthermore a proper service cost accounting might show to what extent pilot outages in general cause service complaints and expense. Further study would show how much could be saved by installing filters. We could then evaluate the savings vs the expense and see

whether we should substitute these free of charge. Therefore, it behooves us to keep abreast of the changing conditions and improvement in the art and keep our cost accounting flexible enough to meet these changes.

Handling Personnel

The Accounting Department might well consider ways and means of keeping its personnel happy. For instance take the matter of pay day and the hour paid. Did you ever try to determine what hour of the day would be most convenient for your employees so they can get to banks before closing time—or even to avoid interruptions in work. I know of one company that has changed pay time with resulting satisfaction to employees and a consequent saving in employee's time—which meant dollar savings to the company. It is further studying to see if further employee's time might not be saved through having a paymaster deliver pay to each employee on his job. There is no single factor to-day which is receiving the attention of Management as is that of Personnel Relations. Management has learned that a happy employee is a good employee. To better insure the happiness of employees in their jobs many a company, a few of them Gas companies, are using aptitude testing in the selection of personnel. One large Gas Company here in New England has used aptitude testing for the past five or six years in selecting employees for accounting jobs. Their results have been surprisingly good. We are now preparing the basic materials to be used in the selection of salesmen by aptitude testing. All of our salesmen through and including the Sales Manager have been tested. Where aptitude testing has been used in selecting salesmen the percentage of good salesmen hired has risen from 35% to 60 and even 70%—certainly a wonderful improvement, but of even greater importance, this method of selection was made for a happier employee—since they are doing the thing that their training and social behavior pattern indicates they are best fitted to do. Therefore, my recommendation to you is first—that in all your dealings with your employees that you be careful of their feelings, and whenever possible explain the reason for your action. It often happens that a course of action taken in the interest of the employee is misunderstood and therefore resented by him. In these days of keen competition for trained personnel we should be careful that we do not do something which will encourage employees to look elsewhere for jobs. Secondly that you study the results of companies using aptitude testing in the selection of personnel.

Load Study Committee

During the past year the Managers of Companies representing some 70% of the meters in New England have been meeting to try and evolve ways and means for determining load trends, markets for gas and a means for evaluating the effect of appliance sales on Gas Revenues. It seems appropriate to mention this Committee's recommendations to this group since if the work is undertaken you will be charged with the execution of much of the program.

The first recommendation is that each company prepare a Fuel and Appliance Survey using meter readers, and that such a survey be repeated every two or three years. Such a survey will tell the extent of competitive inroads, the nature of the competition—where to place sales efforts—the type of equipment best suited to meet the market needs—in fact a basis for a sound New Business program. Full instructions are available or will be for making such a survey. The cost runs from 2c to 10c per meter.

A second recommendation is that we evaluate the result of selling different appliances. In other words try and determine the yardstick for New Business effort.

A third recommendation is that we collect information through a questionnaire of the results of various companies on New Business results showing among other facts the man power used—units sold and costs. Here a uniform interpretation is quite important.

It is evident that the accounting department will be intimately connected with this committee's work and since your Management has made these recommendations it is reasonable to assume you will be hearing more about them.

Conclusion

In conclusion let me state that my experience with various accounting officers had been that they are more than willing to provide the accounting records needed by Management. Our own accounting people go out of their way to suggest ways and means of providing helpful information. This paper is not in any manner intended as a criticism of the accounting department—if anything it is a criticism of Management, since it has not asked for the type of accounting which will prove most valuable. However, it would be a fine thing if you could initiate a move to bring your accounting in step with the needs of the various departments of the Gas Industry. It may be somewhat presumptious in view of the increase in accounting detail being required on the part of the government and regulatory bodies to ask you to assume further burdens. However, the possibilities of saving to our industry are so great through a study of our accounting needs that even with your present burdens it should be undertaken. It might well be that savings could be effected in the present accounting procedure which would offset any increase which at first be incurred in carrying out a cost accounting system. We know there are any number of Summaries of operating figures now being made which are valueless from an operating viewpoint and wholly significant insofar as others are concerned. Let's tackle this accounting problem with a viewpoint of furnishing data useful in determining costs. Let's start with what each Department head needs in order to find out what *each phase* of his operation costs. If we start with the *need* from an operating viewpoint rather than from the viewpoint of Governmental bodies—Tax Commissions and financial people we will wind up with an accounting code as far different from the present one as night and day, but one designed to fit the needs of the personnel that can do most about the figures—*the operating personnel.* This approach may well result in two codes of accounting, one for Operating Personnel and one for the group comprised of Regulatory Bodies—Tax Commissions and Financial Experts.

Let's take the immediate future to put our house in shape to meet the problems of reconstruction to follow this Great World War. What action we take during this time may well determine the future of our industry.

Ride the OLD STOVE ROUND-UP to New SALES PEAKS

ROPER GAS RANGES PRESENT

A Smashing Promotion With NEW Ideas

AGGRESSIVE promotion is just as important today as it ever was. In spite of the fact that sales are good, you must promote to keep your name before the public — to tell about new gas range developments — to get your share of today's market — to stymie competition both present and future.

The new Roper Old Stove Round-Up sales plan is more complete, has more new ideas and more sales appeal than ever before. It will increase sales and profits for you.

Corral Customers With These Sales Helps

★★ Spectacular window displays
★★ Sparkling newspaper ads and mailing pieces
★★ Colorful banners and pennants
★★ Ideas and plans galore to make your ROUND-UP a smashing sensation.

Yippee! Here are a few of many exclusive features to help you rope in those old stoves—

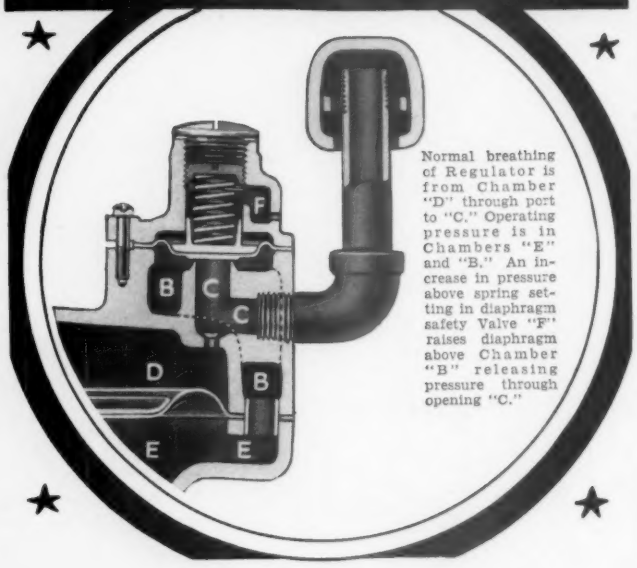
Patented "Staggered Top"
"Glo" Broiler providing infra-red heat
"Peasant-Ware" grill with Serve Tray

GEO. D. ROPER CORPORATION

GENERAL SALES OFFICE AND PLANT: ROCKFORD, ILLINOIS

ROPER GAS RANGES FOR ALL TYPE GASES INCLUDING LIQUEFIED PETROLEUM GAS

REYNOLDS Service REGULATORS WITH DIAPHRAGM OPERATED RELIEF VALVE!



Normal breathing of Regulator is from Chamber "D" through port to "C." Operating pressure is in Chambers "E" and "B." An increase in pressure above spring setting in diaphragm safety Valve "F" raises diaphragm above Chamber "B" releasing pressure through opening "C."

REYNOLDS Service Regulators in the Model 10 and 30 Series with Diaphragm operated Safety Valve offer a new high in performance. This Built-In Safety Valve used with the long removable spring insures extreme flexibility and remarkable accuracy. The extreme sensitiveness of this Safety Valve provides a positive release at any predetermined setting. It is not only positive on releasing but accurately and automatically reseals when normal pressure is restored. A wide range of features and combinations is available on either Models 10 or 30.

Let the Reynolds Engineering Department assist you with your Gas Control Problems. Write!

BRANCH OFFICES

422 Dwight Building
Kansas City, Missouri

2nd Unit
Santa Fe Building
Dallas, Texas

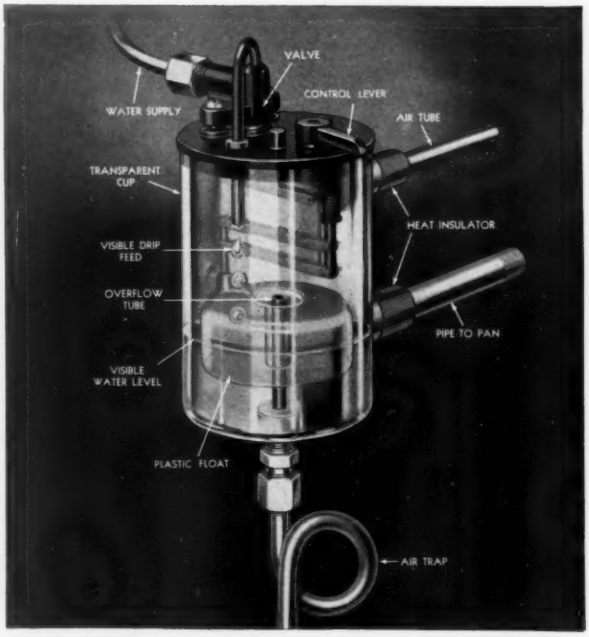
REPRESENTATIVES:

Eastern Appliance Company
Boston, Massachusetts

Wm. A. Ehlers
No. 268 Park Street
Upper Montclair, N. J.

Gas Control Since 1892

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.



MONMOUTH FLOTROL

—the world's finest float control

The Flotrol has *every* feature required for a perfectly functioning float control. Other controls claim this or that *single* advantage, but Monmouth's acknowledged leadership in humidification engineering provides the Flotrol with *all* these exclusive advantages:

VISIBLE WATER LEVEL—A glance at the transparent Flotrol shows height of water in pan. Unnecessary to remove a hot cover and peer around inside.

VISIBLE DRIP FEED—It's easy to see the Flotrol working and know how fast the water is evaporating. But with other controls you can't tell without opening the furnace.

EXTERNAL WATER LEVEL CONTROL—A mere touch of the finger changes water level and evaporating rate. No guesswork or fussing around inside.

SEALED IN MECHANISM—Because it is absolutely trouble-free, corrosion-proof and lime-proof, the Flotrol is the only control that can be permanently sealed to prevent tampering.

SELF-FLUSHING DIAFRAM VALVE—This enclosed, frictionless, non-leaking and non-limeing valve is an exclusive Flotrol feature.

All these advantages and many others make the Flotrol the peer of all float controls. Moderate price due to modern volume production. Get the complete story. Write now to:

MONMOUTH PRODUCTS COMPANY
1939 East 61st St. Cleveland, Ohio

MONMOUTH
The Greatest Name in Humidification

Filling Gas Main With Grease To Make Emergency Shut-Off

By
H. B. Andersen
The Philadelphia Gas Works Company

Original Idea and Its Development

IN A MEETING of our Supervisory Force held in the Spring of 1936 to discuss the lessons which had been learned during the preceding winter, we asked ourselves whether some means could be found, for shutting off gas in emergency from a section of low pressure main, which would take less time than the time-honored method of excavating, tapping, and bagging. Someone suggested that it might be possible to shut off gas by pumping heavy grease through a house service into the main. This suggestion was referred to our Transportation Division, which is in charge of maintaining our street machinery, for experiment and development if the experiments showed promise.

The experiment was made in a length of 6-inch cast iron pipe in our storeyard. We tapped a 1¼-inch hole in the main and ran from it 20 feet of ¼-inch pipe to represent the house service. On either side of this tap hole we cut a piece 6 inches wide out of the top of the main for a distance of 12 inches and closed the openings with celluloid. We capped both ends of the pipe, connected to one end thereof a pressure regulator, U gauge and air compressor, and at the other end we installed another U gauge, and tapped two openings which were controlled with stop cocks. Air was passed through the 6-inch pipe at a pressure of 7 inches of water column as shown by U gauges and at a rate probably in excess of 3,000 cu. ft. per hour. We then pumped grease through the 1¼-inch pipe and as it entered the main, watched its action through the celluloid window.

After the first test was made, many of the problems involved became apparent. The primary consideration, of course, was the consistency of the grease required. Actually, on that first test we could shut off 5 inches of water column pressure, but the seal blew open at 5½ inches. We then tried a number of fibre greases which seemed satisfactory except that our pumping equipment handled them so slowly that all the speed value of our idea was lost. Our aim, as noted at that time, was to be able to pump enough grease to make a shut-off in five minutes or less that would hold for at least 24 hours against 7 inches of water column. Many more trials of various combinations of grease and equipment finally achieved this aim.

We then experimented with the equipment on the street, by making shut-offs in mains we were about to abandon. These experiments were successful, and showed us that we had a tighter seal than we had expected. To determine how much pressure the grease would hold, after the shut-off had been made on an abandoned main and held for 24 hours, we cut and sealed the main. Mercury gauges were substituted for the water type and the pressure was then built up. The grease held satisfactorily up to 5 inches on the mercury gauge and broke when nearly 6 inches pressure had been applied. We believed this to be a very satisfactory safety factor for our low pressure mains. In the course of the experiments on these mains to be abandoned, we found it entirely feasible to shut gas off in the main by driving a bar through the paving, the paving base, the earth over the main, and finally through the top of the main itself, and then injecting grease into the main through a ¾-inch pipe pushed into the main through the barhole.

All the tests so far described were made during warm weather, and the advent of winter showed that the grease we were using became too stiff to pump when exposed to the lower temperatures. Another series of experiments was conducted on ability to pump various grades of grease, with the result that we determined to use two different grades, one for cold and the other for warm weather.

Various other mechanical troubles were encountered and overcome.

In the few years that have since elapsed, the equipment and the method of storing it for easy handling and transportation have been improved, and on a few occasions in the field, it has been used with marked success. Each case in the field has involved a 6-inch main.

We feel that this "grease" method of shut-off in emergency cases is certainly of advantage under many conditions. There may be cases where the emergency does not justify the later expense of cutting out the two or three feet of pipe which contains the grease. There is no way of which we know, except this, by which the grease can be removed, but perhaps a way can be found. Although we have made no experiments, we believe that 8-inch and perhaps 12-inch low pressure mains could be shut off in this way.

Standard Methods of Operation When House Service is Available

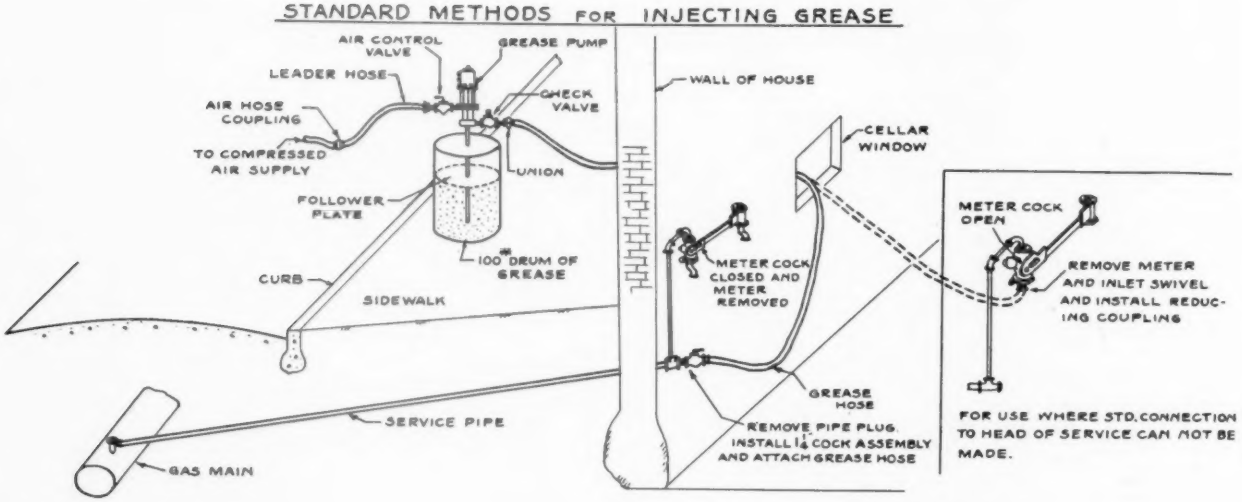
Locate a 100-pound drum of grease either on sidewalk near cellar window, or in basement. Make sure follower plate is in drum on top of grease. Place pump in center of drum, with suction tube through hole in follower plate. Remove plug from end of service and install 1¼-inch cock assembly, shut meter cock and remove meter. Select shortest suitable length of grease outlet hose, and connect one end to the 1¼-inch cock assembly and other end to the pump.

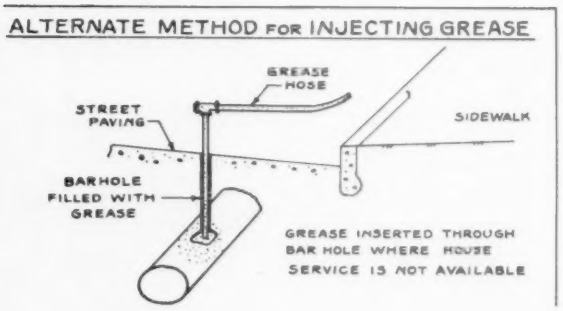
Connect air compressor hose to grease pump, using leader hose to make the connection, and making sure the lever handle on cock at the pump is closed.

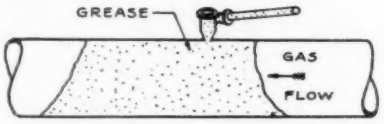
Pump is then ready to operate and can be started by turning on the supply at the compressor and then opening lever cock at air inlet on pump.

If plug cannot be removed from end of service, connect grease hose to meter inlet connection, after first removing meter swivel and substituting suitable grease hose adapter. Open meter cock and proceed as above.

Paper presented at National Defense Forum, Distribution Conference and Motor Vehicle Conference held in Pittsburgh, Pa., April 21-23.




ALTERNATE METHOD FOR INJECTING GREASE
GREASE HOSE
STREET PAVING
SIDEWALK
BARHOLE FILLED WITH GREASE
GREASE INSERTED THROUGH BAR HOLE WHERE HOUSE SERVICE IS NOT AVAILABLE



EMERGENCY METHOD FOR STOPPING FLOW OF GAS IN SMALL LOW PRESSURE MAINS.

Alternate Method of Operation When House Service is Not Available

In case a house service is not available, make a barhole and break a hole in the main. Insert in this hole the ¾-inch pipe with grease outlet hose attached. To stop gas from escaping through barhole, pump grease into it while inserting ¾-inch pipe. When grease is being pumped into the main, hold the ¾-inch pipe down to prevent grease pressure from pushing it out of barhole.

While operating pump, hold it upright in center of grease drum so that follower plate is free to move downward as grease is pumped out of the drum. In case follower plate sticks, push it down by hand.

To stop gas flow, pump the following quantities of grease:

Quantity of Grease for 6", 4" and 3" Mains:

First—⅓ Drum (33 pounds) to fill each 30 ft. of 1¼-inch or smaller service.

Second—⅓ Drum (33 pounds) to build up the grease slug in the main.

For larger mains, and for larger or longer services, proportionately greater quantities of grease will be required.

After use of the equipment, grease should be removed from the rubber hoses to prevent deterioration.

List of Equipment

(1) Lincoln Drum Pump, Model 1778XX—Air inlet equipped with ⅜" lever cock, and ⅜"x¾" pipe coupling connected with two ⅜" close nipples. Air discharge equipped with ½" service "L" with screen to prevent mistaking it for inlet. Grease discharge equipped with ¾" spring, loaded check valve and male half of ¾" union, connected with two ¾" close nipples.

(2) Compressed air supply. Pump uses 32 cu. ft. of air per minute at 100 pounds pressure.

(3) One 12' length ¾" leader hose for connection between grease pump and compressor hose. Equipped with hose nipple, ¾" hose by ½" pipe thread and ¾" air hose coupling on ends.

(4) One 6' length grease outlet hose. ¾" air hose equipped with hose nipple (¾" hose by ¾" pipe thread) on each end, and female half of ¾" pipe union on one hose nipple.

(5) One 10' length grease outlet hose equipped same as 6' length.

(6) One 20' length grease outlet hose equipped same as 6' length.

(7) One male half ¾" pipe union to connect two lengths of grease outlet hose.

(8) Eight 1" pipe plugs.

(9) Two 1"x¾" pipe bushings.

(10) Two 1¼"x¾" pipe bushings.

(11) Two 1½"x¾" pipe bushings.

(12) One 1¼" cock assembly fitted with two bushings 1¼"x¾", and a ¾"x3" nipple.

(13) One grease hose adapter for 5 size meter connection. (½" close nipple and ¼"x½" reducing coupling.)

(14) One grease hose adapter for 20 size meter connection. (1" close nipple, and 1"x¾" reducing coupling.)

(15) One grease hose adapter for 30 size meter connection. (1¼" close nipple, and 1¼"x¾" reducing coupling.)

(16) One grease hose adapter for 60 size meter connection. (1½" close nipple, and 1½"x¾" reducing coupling.)

(17) One ½" T-handle socket wrench for drum lids.

(18) One 9/16" open-end wrench for drum lids.

(19) One cross type wrench with

(Concluded on page 44)

How to make a good impression
IN STILL ANOTHER WAY!

To the man who asks us, "Are savings in purification costs worthwhile?", we have this to say:

Savings in cost of purification never will make or break the gas company...

But, we submit that savings made reflect credit on those responsible for this phase of operations—and that *any* saving, safely made, always is worthwhile. It is good business.

That Lavino Activated Oxides generally show substantial cost reductions, we know. And, we can measure and forecast the probable results in your own plant, under your own conditions of operation. Thus, in your trial of a Lavino Activated Oxide, we can offer you full protection under the Lavino Guaranteed Cost Plan.

We'll be glad to explain this unique offer; no obligation, of course.

LAVINO ACTIVATED OXIDES are made in the U. S. —disinfected against fungi by a special Lavino process.

LAVINO "ACTIVATED" OXIDES — GREATER CAPACITY . . . GREATER ACTIVITY . . . LESS OXIDE REMOVES MORE H_2S!

E. J. LAVINO AND COMPANY
1528 WALNUT ST., PHILADELPHIA, PA.

CRUSE-KEMPER COMPANY
STEEL PLATE CONSTRUCTION
AMBLER, PA.

GAS HOLDERS
HOLDER INSPECTION

RIVETED OR WELDED FABRICATION & ERECTION
TANKS, BINS, FLUES PURIFIERS, WELDINGS

GAS PLANT EQUIPMENT
UGI REFINERY GAS REFORMING PROCESS
UGI NATURAL GAS REFORMING PROCESS
UGI HEAVY OIL PROCESS
GAS DISTRIBUTION
PIPE LINE CONSTRUCTION
THE U.G.I. CONTRACTING COMPANY
A DIVISION OF
UNITED ENGINEERS & CONSTRUCTORS INC
NEW YORK PHILADELPHIA CHICAGO
MAXIMUM RETURN TO CLIENT PER DOLLAR EXPENDED

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS
FOR
ALL MAKES — ALL SIZES OF METERS
LARGEST GAS COMPANIES NOW USING OUR PARTS
SEND FOR OUR CIRCULAR ON METER REPAIR PARTS
SAMPLES AND PRICES GLADLY SENT
— o —
LAMBERT METER CO.
PLAINFIELD, NEW JERSEY

Lower Heating Cost By Humidification

By
O. J. Kuenhold

ADDING moisture to air at any given temperature makes it seem warmer. We all know that when the air on a hot summer day is highly humid, it feels hotter than the thermometer indicates. Similarly, air that is abnormally dry, as air in an unhumidified home during cold weather, feels cooler than it actually is.

Tests made in a gas heated, thermostatically controlled home, over an extended period, shows that when the humidity is increased by 19.3 grains of moisture per pound of air (17½ per cent points of increase) the same comfort is felt at 70° with humidification as at 74° without added humidity. In other words, 4° less heating was required in this case. Laboratory tests made by ASHVE under similar humidity differences show a 2° differential, but these tests were of but two or three hours duration and not under actual living conditions. It is therefore safe to say that moderate humidification will conservatively enable 3° lower room temperature to be carried without any sacrifice of bodily comfort. There will however be distinct gains in breathing comfort.

Having determined that 3° less heating is a conservative assumption, we can calculate the actual percentage of saving in fuel costs by methods which are universally accepted as accurate and correct. As a representative example, assume an uninsulated but weatherstripped house of 10,000 cubic feet of inside space, average construction, glass exposure, etc. An inspection of weather statistics shows that average winter weather of 35° is a fair assumption. To heat such a house to 73° during 35° weather (38° of heating) will require furnace output of 44,480 BTU's, (before humidifying), and 3540 BTU, less if heated to 70° (after humidifying).

To heat and evaporate water however requires 1120 BTU's per pound of water. The house contains 10,000 cu. ft. or 750 pounds of air. Being weatherstripped, the leakage will not be over ⅜th air change per hr., which is 281 pounds. To raise the humidity by 19.3 grains per pound requires 5423 grains which is .775 pounds of water per hr., requiring 870 BTU's per hr. to do the evaporating.

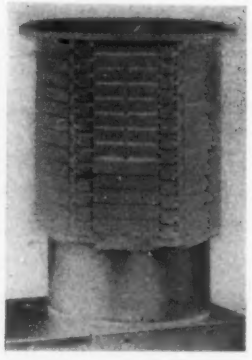
Deducting the 870 BTU's from the 3540 gross reduction of furnace heat output, we have our net gain of 2670 BTU's. Our per cent of reduction in heat output will therefore be 2670/44840ths or 6%. If all windows are equipped with storm sashes the per cent of reduction in fuel consumption will be the same, but for an unweatherstripped house of average leakage, the fuel saving will be 4½%. The above is very definite and the calculations are sufficiently outlined so that any engineer can check them.

To accomplish the above saving in fuel, the humidifier must have adequate evaporating surface or capacity to raise the humidity by 17½ per cent points with 70° room temperature and the furnace or boiler under the intermittent operation or reduced output such as occurs in average winter weather. Where the humidifier has about one-fifth of required capacity the possible saving will be about one-fifth as much.

The water evaporated is so small that its cost can be disregarded. A single dripping faucet can lose several times as much water as is required for the house in the above example.

HIGH AND LOW ENDS STOP AND GO

THE REPUBLIC
GRADIENT-HEET BURNER
PROVIDES
CONTINUOUS HEATING
WITH
THE GAS INPUT
AUTOMATICALLY GRADED
uP or DOwn
TO MATCH
THE OUTSIDE WEATHER



NOW— STANDARD EQUIPMENT ON EVERY REPUBLIC CONVERSION BURNER

AUTOGAS COMPANY
CHICAGO ILLINOIS

Gas-fired Kitchen Equipment Pleases Restaurateur

By
John E. Hubel

"YOU CAN DO IT BETTER with gas"—that time-worn slogan of most gas companies, was exemplified to a surprising degree when the management of Lion's Cafe, the most popular one in Fond du Lac, Wis., changed from coal-fired ranges and other equipment to gas in its kitchen. Discussing the new equipment when it was installed, manager John Hau of the Cafe said: "The whole atmosphere of our kitchen is improved. The heat from our insulated gas-fired ovens that gets into the kitchen is nothing like the heat that came from our old coal ranges. We were even able to leave the exhaust fan off one day recently, something we could never do before when burning coal in the kitchen. We know it improves the efficiency of our air conditioning system not to have so much waste heat."

The equipment in this kitchen, all gas-fired, consists of the following: Two solid-top sections of gas range, including insulated ovens and oven temperature controls; a single-section, automatic gas deep fat fryer; a gas fired steam table; coffee urn; bake oven for rolls and pies and a gas heated dish washing machine. In short, it is one of the most "gas conscious" restaurants of the better class that can be found in Wisconsin, according to the local gas company, the Wisconsin Power & Light Co., operating in central Wisconsin.

In addition to keeping the heat where it does the most good—inside the range, oven and other apparatus, it is reported to be cutting down the cost of the air conditioning system which was installed some time ago in this restaurant. As it was in operation some months before the change to gas-fired apparatus in the kitchen was made, the system was taxed to keep the restaurant proper in comfortable condition for the diners, as some of the heat from the coal burning ovens, etc., would seep into the restaurant from the kitchen. With the coal burning ranges, etc., the exhaust fan had to be kept in operation constantly in the warmer months, which is not the case since the gas-fired apparatus was installed in the kitchen.

Corner of Kitchen of the Lion Cafe, Fond du Lac, Wisconsin. All appliances are Gas-operated.

Asked about gas consumption, manager Hau estimated that the gas costs about one cent per meal, which, he stated, takes into consideration the cost of operating the gas-fired bake oven, steam table, water heating and dish washing, the total consumption being about 14.8 cubic feet per meal on the average. (In Fond du Lac, we learn, the commercial gas consumption is figured on the basis of 9c per C cu. ft. for about 20,000 cu. ft. to 5c for all over 200,000 cu. ft. per month.)

Auxiliary meter readings on the kitchen equipment showed a cost per day of about 14c more than had been spent for fuel when coal was used in the kitchen equipment, but this was more than offset by the savings in the operation of the air conditioning system, as the heat from the oven and ranges was not spread out over the rooms where it would do no good except on the coldest winter days.

According to the management, the shrinkage of roasts was cut down considerably in the ovens after the gas-fired equipment was installed. One test conducted in the Lion's Cafe kitchen showed a 17¾ lb. roast had only shrunk 2¼ lbs. after being subjected to 300 degrees F. in the gas-fired oven for the required period of time, as against a shrinkage of about 5 lbs. in a similar weight roast when the coal-fired stove and ovens were in use.

The chef at the Lion's Cafe is enthusiastic over the good work done by the gas-fired deep fat kettle. This is being used for hamburger, chicken, unbreaded chops and steaks as well as for fish, potatoes and pork cutlets. In general, all of the gas-fired equipment in this kitchen has had a good effect on the help as well as in results in dollars and cents. Those interviewed say it makes their work easier, and it is a pleasure to work in a kitchen that keeps you comfortable even in warm weather. Now none of those employed in the Lion's Cafe kitchen would want to go back to the old way.

Statement on the Oil Requirements of the Manufactured Gas Industry

To the Petroleum Coordinator for National Defense:

My name is T. J. Strickler of Kansas City, Missouri. I am the President of the American Gas Association comprising in its membership more than 90% of the natural and manufactured gas industry of the United States.

During the year 1939, the last year for which complete statistics are available, the manufactured gas industry had a total output of 242,863,000,000 cubic feet. Of this total 156,969,000,000 cubic feet were of water gas and 5,857,000,000 cubic feet of oil gas. These are, respectively, 64.6 and 2.4 per cent of the total manufactured gases above referred to.

This water gas production and distribution, mainly confined to the Atlantic Seaboard States and the Pacific Northwest, is dependent upon fuel oil. There is no possible substitute for fuel oil and any statement to the contrary is in error.

Seventeen states, fifteen Eastern Seaboard and two in the Northwest, used 211,512,000 barrels of fuel oil (1939) approximately 45% of the total United States requirements for fuel oil used. Of these the gas industry used only 5.3 per cent of the total light oil and 7.1% of the heavy oil.

Production and distribution of water gas in all of the states where it is made is used for cooking, water heating, space heating, and in many cases for house heating and refrigeration.

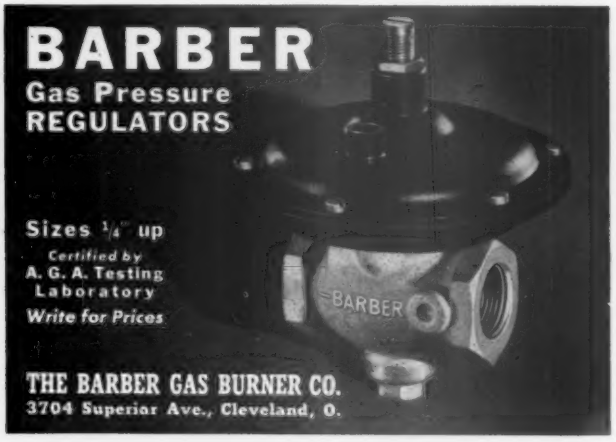
The companies supplying these states with gas furnish service to a population of thirty-three million people of which approximately seven million are actual customers. For them, in many cases, there is no other source of fuel.

In 1939 it required 14,978,000 barrels of light and heavy oil, which was only 3.2 per cent of the national production of fuel oil used in the United States.

Not only is gas a necessity at all times but especially so in periods of national emergency when unusual demands are being made upon many of our companies in defense housing and in the demands of persons who have been re-employed on defense and related projects.

The American Gas Association requests the Petroleum Coordinator to take the necessary action that will insure an adequate supply of fuel oil for the production of water gas and oil gas in these areas. It is a matter of life or death.

Respectfully submitted,
T. J. Strickler, President



ALFRED I. PHILLIPS
CONSULTING ENGINEER
Rate Developments Valuations
Reports Design
Management
53 PARK PLACE NEW YORK

Photo courtesy of C. M. Kemp Mfg. Co.

FULTON
Weighted
Illuminating
REGULATOR

Instrument Precision for Low-Pressure CONTROL

The Fulton Weighted Illuminating Regulator is designed to reduce inlet pressures of 40 pounds maximum to any delivery pressure from atmosphere to 5 pounds. Highly sensitive—gives precise regulation of extremely low pressures where differential is very slight. Perfectly adapted for heat-treating furnaces for atmosphere controllers. May be used as zero governor or relief valve. Write for details.

The CHAPLIN-FULTON MFG. CO.
28-40 PENN AVE. CF PITTSBURGH, PA.

RECENT COURT DECISIONS Affecting Gas Utilities

Review of New Higher Court Cases Involving Gas Explosions

By
Leo T. Parker
Attorney at Law
Cincinnati, Ohio

DURING the past few weeks the higher courts have rendered several unusually important decisions involving injuries caused by gas explosions. Obviously, all gas companies are subject to suits of this nature. And, therefore, the advisability of gas company officials keeping informed of modern testimony is apparent. In this manner they may readily conduct the affairs of the company and instruct employees from a legal viewpoint for the purpose of avoiding liability where unavoidable suits are filed against the company.

Notice Is Important

It is well established law that where gas company officials or employees are notified that gas is escaping, it is the legal duty of the company employees to immediately make an investigation and shut off the gas. This rule of the law is applicable notwithstanding certain state laws or city ordinances which prohibit gas companies from shutting off gas.

For example, in Mrdalj v. Public Service Company of Northern Illinois, 31 N. E. (2d) 978, reported April, 1941, it was shown that the Public Utilities Act provides that gas companies are not permitted to shut off gas for the purpose of making an inspection.

One day a property owner went to a gas company's office to pay the monthly bill for gas. After paying the bill he complained to the cashier about the odor of gas in the water of a cistern and was referred to the "Service Department," where he reported the odor in the water to a man in charge. He was told that someone would be sent out to investigate but the company made no investigation nor attempted to make any repairs. Soon afterward the property owner was killed when the gas in the cistern exploded. Suit was filed against the gas company and proof was given that the gas in the cistern had leaked from a service pipe over which the gas company had control. The gas company officials attempted to avoid liability on the grounds that in view of the above mentioned state law the company was not permitted to shut off gas to make an inspection. However, the higher court held the company liable, and held:

"Where a gas company had been notified of odor of gas from water in cistern before explosion, which killed owner of property, the gas company could not defend on the ground it was prohibited by Public Utilities Act from shutting off gas to make inspection, since where gas company has knowledge that gas is escaping in a building occupied by consumer it is the gas company's duty to shut off gas supply until necessary repairs have been made."

On the other hand, see the leading case of St. Marys Gas Company v. Brodbeck, 114 Ohio St. 423. In this case there was evidence of a sewer opening into a garage from which sewer gas might escape. There was also in the garage a tank containing gasoline. The evidence showed that the meter and pipes from which it was claimed gas escaped were in good condition and there was no evidence of any notice to the gas company of any defect. The higher court held the gas company not liable.

What Is "Reasonable Care"?

Various higher courts have held that a gas company, in the conduct of its business, is bound to use reasonable care to prevent the escape of gas upon private premises. A reasonable degree of care in view of the dangerous character of gas and its tendency to escape means that care commensurate with the danger that would probably result if such care were lacking. Failure to exercise this degree of care usually results in the gas company being liable in damages for injuries to persons or property.

However, readers will be enabled to comprehend the law on this subject better by reviewing in detail an unusually important late higher court case, rather than by mere explanation. Therefore, we shall carefully consider the facts of Barbeau v. Buzzards Bay Gas Company, 31 N. E. (2d) 522, reported February, 1941.

The facts of this case are that a person conducted a gasoline filling station and an automobile repair shop in a building owned by him and supplied with gas by means of a service pipe which ran from the gas main to the building. One day the service pipe was bent by a mechanical shovel operated by a contractor who was laying a water main on the street. The bend in this service pipe was about twelve feet from the above-mentioned building. Later, the contractor filled in the trench, and tramped down the earth by running over it a three and one-half ton truck loaded with rocks and also by using a gasoline roller. When the owner of the building arrived at his place of business he noticed a strong odor of gas. He opened the windows and doors and telephoned to the gas company. Within twenty or twenty-five minutes the gas company's employees came to his premises and uncovered two feet of the service pipe a short distance from the corner of the building. One of the men threw a match into this excavation and

there was a flame which they then extinguished by putting earth upon it. They then began to dig over the main on the street, where the pipe had been bent by the mechanical shovel. Later the service pipe was exposed, and found to be cracked. This leak was repaired "and everything was all right." He closed the doors and windows and lighted a fire in the stove. Soon an explosion occurred which effected serious damages. He sued the gas company for the resultant damages.

During the trial testimony was given which proved that the explosion was caused by a gas that had entered the cellar from the ground around the pipes going into the building. In other words, the gas in the cellar had accumulated before the gas company employees had repaired the leak in the service pipe and the gas had remained in the cellar to be exploded later, and after the repairs to the service pipe had been completed.

The counsel for the gas company argued that the company employees had used reasonable care by responding to the call and repairing the service pipe. However, it is interesting to know that the higher court held the gas company liable and said:

"The defendant (gas company) contends that the escape of the gas was due to the negligence of the contractor, and that as soon as it had notice of the leak it acted with reasonable diligence in preventing further escape of the gas and in repairing the leak. . . . Even if we assume that the gas company employes were not negligent in failing to discover the leak prior to receiving notice from the plaintiff on the morning of the explosion, and that they acted reasonably in repairing the broken pipe, yet the jury could find that the employes had learned from the two excavations they had made that a considerable quantity of gas had escaped from the cracked pipe; that the gas that had escaped would travel along any pipes, especially where the ground had been frozen, into the plaintiff's building. . . . They knew or ought to have known that the gas, which was heavier than air,* had lodged in the plaintiff's cellar. . . . The jury could reasonably infer that . . . when the leak was repaired one of the defendant's employees told the plaintiff that 'everything was all right.' A finding that the defendant had undertaken to eliminate this free gas from the plaintiff's premises was warranted, as was a further finding that the defendant had negligently failed to remove such gas before the explosion occurred."

Gross Negligence

When gas company employees fail to use "reasonable care" to protect consumers from injury they merely are "ordinarily" negligent. However, when such employee fails to use any care, they are "grossly" negligent. And while the same amount of damages is allowable to injured gas consumers under either circumstances, yet a jury may not hesitate to hold a gas company liable under testimony of gross neglect, whereas under the same circumstances of an ordinary negligent charge, the company may avoid liability.

For illustration, in Oklahoma Natural Gas Company v. Graham, 111 Pac. (2d) 173, it was shown that a consumer sued a gas company to recover damages to her health alleged to have been sustained as the result of wrongful disconnection of gas service. She alleged, in substance, that during her absence from home the gas company employees had wrongfully disconnected her gas service; that due to the lack of a telephone in the house she had to expose herself to cold and rain in order to report the breach of service to the company; that in an endeavor to obtain a restoration of her service she had been compelled to leave the premises a number of times, and that as a result of such exposure and of having to remain in an unheated house several hours she contracted a severe cold which resulted in injury to her general health.

In view of the fact that the gas company employees had disconnected the gas while the woman was not home and without any legal right to do so, the jury held the gas company liable for $500 damages. The higher court upheld this verdict, and said:

"There is ample evidence in the record to establish the fact that the defendant (gas company) was negligent when it disconnected the plaintiff's gas service and that the plaintiff acted with reasonable prudence in leaving her house to report the fact to the defendant and in attempting to have her service restored. The evidence is also undisputed that she contracted a severe cold immediately following her exposure and that the doctor who was called to treat her was of the opinion that the exposure which she had undergone while her gas service had been disconnected had caused the disability which the plaintiff has sustained."

Law of Contributory Negligence

All gas company employees should repair, eliminate, and avoid dangerous gas appliances. In other words, mere notification and a warning given by gas company officials to consumers of existence of a dangerous condition is not sufficient to avoid ordinary liability.

On the other hand, any person who suffers an injury as a result of his own carelessness is "contributory negligent" and he cannot recover damages for the injury.

For illustration, in Ruth v. Hutchinson Gas Company, 296 N. W. 136, reported March, 1941, it was shown that a gas company loaned certain heating equipment. The employees warned the users to leave open a ventilator and permit fresh air to enter the building, and to *not* close all windows and doors. However, certain of the users failed to heed this warning and suffered serious results from carbon monoxide poisoning. They sued the gas company for damages. But since their own negligence resulted in the injury the higher court refused to hold the gas company liable, saying:

"Carbon monoxide gas is colorless and to most people practically tasteless and odorless. Its effect upon the human system depends upon its density. A concentration of one-fifteenth of one per cent is dangerous to human life, two-tenths of one per cent is usually fatal, and one per cent is regarded as fatal within a very short time. The density of a particular concentration in a given place depends not only upon the amount of carbon monoxide gas produced there, but also upon the extent of the elimination of the carbon monoxide gas and the introduction of fresh air. . . . The negligence of one was attributable to all. Hence, if one of them negligently closed the ventilator, all were charged with such negligence. . . . The question of contributory negligence does not require extended discussion. Contributory negligence on the part of the injured party is a defense to a charge of negligence."

Defective Condition Unknown

Therefore, it is quite apparent that gas companies may with certainty avoid liability in damages for all injuries to persons and property by proving that the injury resulted from carelessness of the party who filed the suit.

Now, we shall consider another phase of law under which gas companies may avoid liability in damages for injuries to persons and property.

It is important to know that various higher courts have held that where an appliance is owned and controlled by the owner or occupant of the premises and a gas company did not sell or install the appliance, but merely furnished gas to it, such company is not responsible for the condition of the appliance, and is not liable to the owner or occupant of the premises for injuries caused by its defective condition unless the gas is supplied by the company with actual knowledge on its part of the defective and dangerous condition of the appliance.

For example, in Cornett v. Georgia Public Utilities Company, 11 S. E.

(2d) 68, reported November 21, 1940, it was disclosed that a person rented a building and authorized gas company employees to turn on gas. A gas water-heater and the pipes and vents connected therewith, which was not installed by the gas company, had been installed by the owner of the building long before the tenant moved into the premises. Moreover, the heater and equipment had been used for several years by former occupants, and it appeared to be in good condition.

One day when the tenant used the gas water-heater in heating water to take a bath, and while bathing she was overcome and rendered unconscious for several hours, as a result of inhaling carbon monoxide and kindred gases which had escaped from the gas water-heater into the atmosphere of the bathroom. She sued the gas company and alleged that the gas company employees were negligent in not providing proper vent pipes and vents for the escape of the carbon monoxide and other gases to the outside of the dwelling, before turning on the gas. Also, she alleged that the company officials were negligent because when the employee turned the gas on in the house the pipes were rusty, filled with leaves, debris and decay, and were unfit for use.

It is interesting to know that the higher court refused to hold the gas company liable, and said:

"Under the allegations of the petition there was no duty on the defendant (gas company) to inspect the gas water-heater and pipes and vents connected therewith, as they were owned and controlled by the owner of the building or the occupant thereof, and not by the defendant."

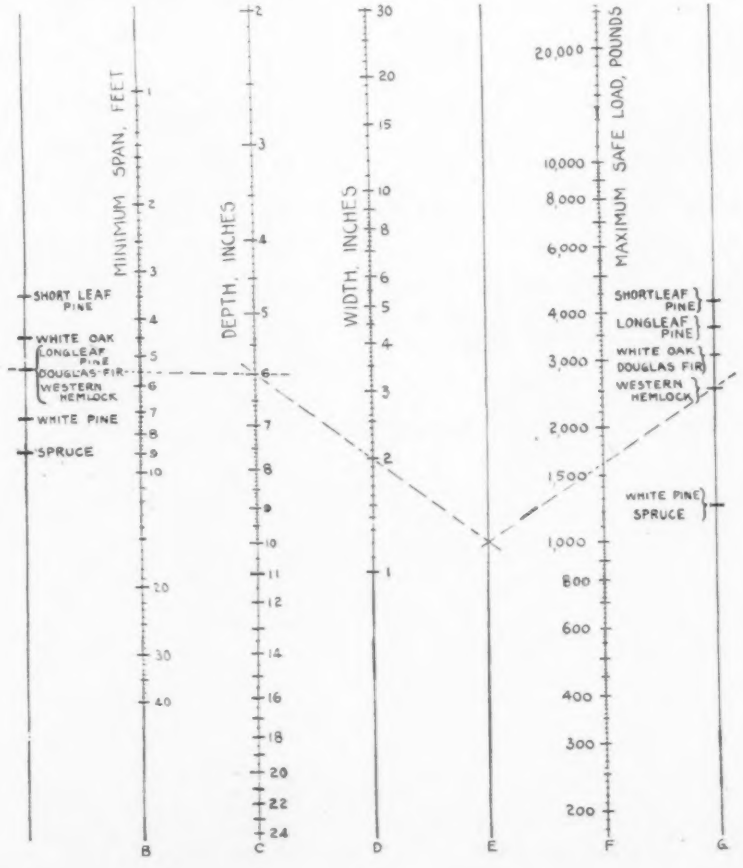
This Simple Chart Gives the Safe Strength of Wooden Beams

By

W. F. Schaphorst, M.E.,

Newark, N. J.

The accompanying chart will be found handy for selecting safe beams made of the ordinary woods such as shortleaf pine, white oak, longleaf pine, Douglas fir, western hemlock, white pine and spruce. It is based on data adopted by the American Railway Engineering Association for safe uniformly loaded wooden beams of rectangular section.



To use the chart simply zigzag a straightedge across three times, or stretch a thread across three times as indicated by the zigzag dotted line, and the problem is solved.

For example, it is desired to hold 200 lb. per ft. on a wooden beam of 2 in. by 6 in. western hemlock over a span of 5 ft. Will the beam be safe?

Run a straight line from the point in column A opposite "western hemlock" over to the depth 6 in column C. The intersection with column B shows the minimum span to be 5.5 feet. The beam will therefore be safe as regards span.

Then from the depth 6 in column C run a straight line through the width 2 in column D and locate the intersection in column F. Then from that point of intersection run a straight line over to the point in column A opposite "western hemlock." The answer is found at the intersection with column F and is 1600 lb.

Since it is desired to hold only 5 × 200 or 1000 lb. on the beam, and since the beam will actually hold 1600 lb., it certainly is amply safe. In fact, the chart shows that a beam made of white pine or spruce would be safe under the load.

Inversely the chart may be used for finding any unknown factor or factors. If the kind of wood and the span are known the first straight line through column A, B, and C gives the minimum depth of beam which must be used. If the width of beam is unknown the line through the column E, F, G is located next and lastly the line through column C, D, E gives the minimum width of beam in column D. It is all so simple that further explanation is unnecessary.

The weight of the beam itself is included in the safe load given in column F, hence the user of the chart need not worry about that point.

Book Reviews

Wage and Hour Manual, 1941 Edition. Published by the Bureau of National Affairs, Inc., 2201 M Street, Washington, D. C. Price $5.00.

This volume supersedes a 1940 edition and contains about 500 pages more than its predecessor. It embraces, so far as can be discovered, all documentary material on Governmental regulation of wages and hours—the laws, administrative regulations and interpretations, and decisions of the courts. More important, the documents are arranged intelligently, fully indexed and interspersed with non-technical explanatory articles.

Supplementing the basic material are some 300 authoritative answers to questions on the law's application to specific cases, charts illustrating the scope of various exemptions, sample payroll forms and other devices designed to translate the law into terms understandable by the lay employer.

Of particular value to attorneys is a compilation of all court decisions under the Wage and Hour Law to March, 1941. Some 120 opinions, with carefully written headnotes, are presented either in text or in digest form. Each chapter also includes an analysis of court decisions on the particular topic treated.

The volume is in three parts, the first containing 17 chapters which treat separately the overtime, minimum wage and other provisions of the Fair Labor Standards Act. In Part II similar attention is given the Walsh-Healey Public Contracts Act and miscellaneous federal laws regulating wages and hours. State legislation is treated more briefly in Part III with digests of wage, hour, child labor and industrial homework regulations for each state.

The editors of the Manual have devoted 50 pages to an exhaustive topical index and table of cases which add immeasurably to the value of the volume as a reference source.

Sabotage—How to Guard Against It, by Harry Desmond Farren. Published by National Foreman's Institute, Inc., Deep River, Conn. 56 pages. Price $1.00.

This is a manual for Key men, executives, supervisors, guards and the better class workmen.

Written in a very interesting way, it first describes past acts and efforts at sabotage. It then outlines what should be done to protect against such acts in the future.

It is well written, timely and definite, and may be read with profit by any good American.

New Ammonia Plant At Wilson Dam

Production of synthetic ammonia for the manufacture of explosives soon will be under way in a new, modern "black-out" plant at Wilson dam, near Sheffield, Ala.

This was revealed with the announcement that Koppers Company, Bartlett Hayward division has been awarded a contract by the Tennessee Valley Authority for the construction of one of its semi-water gas plants and auxiliary equipment.

Construction will be started as soon as possible and the plant is to be ready for operation 90 days later.

The plant will produce about 20,000,000 cubic feet of gas a day from coke, steam and air. It will provide the elements from which other equipment will create the synthetic ammonia. The amount of ammonia or the quantity of explosives which will be produced was not revealed.

The "black-out" building which will house the Koppers plant will be built by Stone and Webster and will be without windows but will be equipped with ventilating devices designed to prevent the escape of light from the interior. Dust traps of Koppers design will prevent the escape of incandescent carbon from the plant stacks. This, also, is a precaution against night-time observation from the air.

Equipment will consist of four 12-foot mechanical generators which will be fully automatic in operation and control, making continuous operation possible. Other equipment includes combustion chambers, steam accumulators and waste heat boilers.

Terre Haute Files For Rate Decrease

The Terre Haute (Ind.) Gas Corporation, recently formed subsidiary of the Indiana Gas & Chemical Corporation, has purchased the physical properties of the Indiana Gas Utilities Company and Alfred M. Ogle, President of the Indiana Gas & Chemical announced that petitions would be filed at once for a decrease in rates.

Purchase price was $1,250,000 according to terms approved by the Indiana Public Service Commission and by federal court. Included in the transfer are gas distribution systems serving Terre Haute, West Terre Haute, Clinton, Seelyville and Brazil, Ind. The company manufactures artificial gas.

REED'S 4 WHEEL
Razor Blade Pipe Cutters

IDEAL FOR ANY TRENCH OR OTHER CLOSE QUARTER JOBS

$5.11 F. O. B. ERIE

Capacity
½" to 2"
Weight 5 lbs.

The REED FOUR WHEEL Cutter operates with a short back and forth motion through only one-third of a circle. Each of the four wheels exerts the same pressure on the pipe, and all 4 therefore cut evenly and completely through the pipe at the same time.

Equipped with Reed special alloy RAZOR BLADE Wheels, which cut with remarkable ease, leave little burr, and have a long life of useful service.

A sample cutter for test and trial may be ordered on memorandum invoice, to be paid for if retained or returned for credit if unsatisfactory. Try it once, and you will use no other.

REED MFG. COMPANY
1436 W. 8th Street • ERIE, PA.

News of the Gas Industry

Dwelling Units for Defense Workers At Newport Have Complete Gas Service

The first group of 262 dwelling units for defense workers in Newport, R. I., is now being occupied. On Tuesday, June 17th, gas was turned on at this project with due ceremony to be used for cooking, refrigeration and automatic water heating in each unit.

The ceremony of opening the valve was performed by W. S. H. Dawley, Chairman of the Housing Authority of Newport and John A. Weiser, Vice-President of The Newport Gas Light Co. In the group photograph from left to right are: E. J. Wilson, Supt. of The Newport Gas Light Company, J. Earle McLennan, President of the Newport Chamber of Commerce and member of the Newport Housing Authority, William J. Donovan, Executive Secretary of the Newport Housing Authority, H. B. Maynard, visiting gas company executive from Waterloo, Iowa, John A. Weiser, Vice-President and General Manager of The Newport Gas Light Company, W. S. H. Dawley, General Manager of the Ford Agency of Newport and Chairman of the Housing Authority of Newport, George F. Wells, Jr., Sales Manager of The Newport Gas Light Company, James J. Sullivan, Sr., Foreman of the Street Dept., The Newport Gas Light Company, Arthur J. Sullivan, Attorney member of The Newport Housing Authority, J. Henry Cremin, Insurance Agent and member of the Housing Authority, Fred Turgeon, General Contractor, James Sullivan, Jr., Chief Inspector of the Housing Authority of Newport, John Wright of the architectural firm of Wigham and Van Alen and Walter E. Sullivan, Plumbing Contractor.

Photograph of the kitchen shows gas range, sink, cabinets and Servel refrigerator. The automatic water heaters are not shown in the photograph, because they are placed in a utility room beneath the kitchen of each unit along with the heating plant.

The project is the first of three projects in Newport, totaling 1,400 dwelling units, which will use gas. These units are available to defense workers in the various departments of the Navy at the Naval operating base including the Naval Torpedo Station and are also available to married enlisted personnel of the Navy.

Typical kitchen in one of the Dwelling Units showing gas range and Servel Refrigerator.

The Ceremony of Turning on the Gas Service

Manufacturers Pledge Full Support to National Defense At A.G.A.E.M. Convention

Pledging the "fullest measure of support to the National Administration" in its unlimited emergency, the Association of Gas Appliance and Equipment Manufacturers keyed its sixth annual convention to the importance of tying in with defense efforts. The event was held June 3-6, at the Ambassador Hotel, Los Angeles.

"Business as usual is out until we are over the present economic hump," W. E. Derwent, A.G.A.E.M. president, stated in an address delivered at the Wednesday morning, June 4, general sessions. "We are witnessing the birth of a new industry which will build payrolls. I feel confident that we are making definite progress in creating payrolls in an increasing volume. We have an opportunity to be of great service to our nation and our people."

R. A. Hornby, president of the Pacific Coast Gas Association, stated that the defense adjustment would not get the industry down, but only make them dig in deeper and work harder. Salesmen must "apply their minds, hearts and feet to the job" in the "fighting forties" as they did in the "terrible thirties," he went on. He pointed out the importance of motion pictures as a promotional medium.

W. R. Smith, chairman of the manufacturers section of the Pacific Coast Gas Association, reviewed West Coast activities. Mr. Smith speaking of the sales campaigns stated, "Our campaigns which have been held on the Pacific Coast, we feel have been outstanding. Our modern ranges have set high standards. Our water heater contests and campaigns have built up the standards of appliances all the way along the line. This is true not only of Southern California but it goes on up through the states of the entire Pacific Coast."

George Green, president of the National Retail Hardware Association, stressed the opportunities open to gas appliance and equipment manufacturers through hardware dealers.

C. E. "Deke" Houlgate, special representative of the American Gas Association reviewed the activities in promoting gas appliances on the Pacific Coast, especially in the motion picture industry. Mr. Houlgate mentioned the first year of trying to establish gas appliances as standard props in motion pictures and said, "the rest is history. We can point with pride to the fact that over a five-year period 202 all-gas kitchens have been flashed on the screen. Including these kitchen sets, 389 gas ranges and, what is even more significant, 238 Servel refrigerators have visited the movie lots. There was also a total of 64 water heaters and 35 space heaters that got themselves etched in celluloid." Mr. Houlgate concluded by stating that, "Today Hollywood uses gas appliances 100 per cent in its outstanding pictures."

C. W. Berghorn, Managing Director and W. E. Derwent, President of A.G.A.E.M. and Vice President of Geo. D. Roper Corporation, going over Convention details at the Ambassador Hotel.

Louis Ruthenburg, president of Servel, Inc., presented the research committee's recommendations for the establishment of an "Institute of Gas Technology." Purposes of the institute would be research on natural and manufactured gases; applied research on improvement and development processes; training of young college men for the industry; collection of a scientific reference library and publication of printed material; and stimulation and coordination of research throughout the industry.

Mr. Ruthenburg concluded his address by stating, "Now, it seems to me that these recommendations for a carefully developed Institute which may supply a great need to the entire industry and which may be the means of bringing even closer the relationship between the manufacturers and the utilities, and it seems to me so obvious that this should be enthusiastically and generously supported by the manufacturers who, after all, may benefit more than any other group that I do not need to belabor that point."

June 5, following the general sessions, was primarily devoted to social activities, including a golf tournament, a tour of various places of interest about the city. a cocktail party and the president's dinner. A trip to Catalina Island was scheduled for Friday, June 6.

Guests at the president's dinner included Bob Hope, motion picture and radio comedian and Don Wilson, well known radio announcer. Hope and Wilson entertained the delegates and guests with amusing stories and ad libbing.

All officers were reelected. W. E. Derwent, vice-president of Geo. D. Roper Corp., is again president; W. F. Rockwell, president of Equitable Meter Co., first vice-president; Lyle C. Harvey, vice-president of the Bryant Heater Co., second vice-president; and John A. Fry, president of Detroit-Michigan Stove Co., treasurer.

A.G.A.E.M. Becomes Member of American Standards Assn.

The Association of Gas Appliance and Equipment Manufacturers became a member-Body of the American Standards Association in April, thus becoming entitled to a voice in all actions of the ASA

CONVENTION CALENDAR

August

18-20 *Appalachian Gas Measurement Short Course,* Morgantown, W. Va.

September

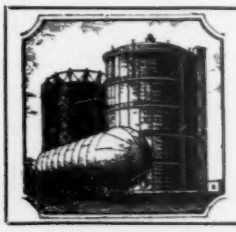
8-10 *Mid-West Gas School and Conference,* Ames, Iowa.

10-12 *Pacific Coast Gas Assn.* Annual Convention, Del Monte, Calif., Hotel Del Monte.

October

6-10 *National Safety Congress and Exposition,* Chicago, Ill.

20-22 *American Gas Assn. 25th Annual Convention,* Atlantic City, N. J.



STACEY BROTHERS
Gas Construction Co., Inc.
"STACEY-KLONNE" & TELESCOPIC GAS HOLDERS "STACEY BULLET" PRESSURE HOLDERS
PURIFIERS AND STEEL PLATE CONSTRUCTION
Executive Offices: Cincinnati, Ohio
Eastern Office: 21 West St., N. Y. C.

Members of the American Gas Association Refrigeration Committee at the Evansville (Ind.) Country Club where the group had luncheon. The Committee met on June 20th in Evansville as guests of Servel, Inc. to discuss next year's sales campaign and review progress of this year's campaign to date. The business meetings were held at the Servel plant.

Left to right, front row: H. C. Porter, Kansas City (Mo.) Gas Co.; C. S. Stackpole, Consolidated Gas Electric Light & Power Co., Baltimore, Md.; Charles Davis, Birmingham (Ala.) Gas Co.; Louis Ruthenburg, Servel, Inc.; B. T. Franck, chairman, Milwaukee (Wis.) Gas Light Co.; George S. Jones, Jr., Servel, Inc.; W. S. Redpath, The Equitable Gas Co., Pittsburgh, Pa.; Frank Williams, American Gas Association, New York, N. Y., and C. V. Sorenson, Northern Indiana Public Service Co., Hammond, Ind.

Second row: R. J. Canniff, Servel, Inc.: C. B. Wilson, Arkansas-Louisiana Gas Co., Little Rock, Ark.; O. J. Haagen, Ohio Fuel Gas Co., Columbus, Ohio; A. J. Maloney, Washington (D. C.) Gas Light Co.; J. L. Johnson, Providence (R. I.) Gas Co.; and F. H. Trembly, Jr., The Philadelphia (Pa.) Gas Works Co.

on approval of standards or initiation of new standardization projects. Frank H. Adams, Vice-President, Surface Combustion Corporation, Toledo, Ohio, was named by the Association to serve as its representative on the ASA Standards Council which has the final vote on all such actions. C. W. Berghorn, managing director of the Association, will serve as Mr. Adams' alternate.

New American Standards For Gas Equipment Adopted

On May 12, 1941, final action was taken by the American Standards Association in adopting as American Standard three sets of requirements sponsored by the American Gas Association. These include standards for portable gas baking and roasting ovens, furnace temperature limit controls and fan controls, and for semi-rigid gas appliance tubing and fittings. While the last named are now in their fourth edition, those for baking ovens and temperature limit and fan controls are now available as national standards for the first time. All three sets become effective on January 1, 1942.

To permit sufficient time for interested manufacturers to construct their equipment to meet these newly adopted standards, mimeographed copies thereof have already been distributed to them. Any manufacturer so desiring may submit his products for test for conformity with their provisions in advance of the date on which they become effective. Under such conditions Certificates of Approval or Listing will be dated as of the effective date of such standards.

Acceptance by the American Standards Association of these additional requirements brings the total number of American Standards for gas-burning appliances and their accessories sponsored by the American Gas Association to 29.

Crompton Joins Golden Brown Appliance Co. of Lynn, Mass.

Frederick Crompton, formerly engineer with J. C. Pitman & Sons of Lynn, is now associated with the Golden Brown Appliance Manufacturing Company of that same city in the capacity of treasurer, as well as engineer. This company manufactures a commercial line of gas-fired deep fat fryers.

SUPERIOR GAS METERS

For Sound Values and Continuous Operating Economy

Meters for Domestic and Industrial Use. All Sizes 5B to 60C.
Wet Test and Demonstration Meters — Diaphragms —
Service Cleaners — Provers — Meter Repairs

Write for details and quotations

SUPERIOR METER COMPANY, INC.

167 41st Street Brooklyn, N. Y.

A Century and A Quarter of Continuous Public Service

June 19th marks the 125th anniversary of the granting of the first gas franchise in America and the founding of The Gas Light Company of Baltimore, from which descended the Consolidated Gas Electric Light and Power Company.

Marking the 125th anniversary of the granting of the first gas franchise in America to The Gas Light Company of Baltimore on June 19, 1816, and reviewing the ensuing century and a quarter of continuous public service, the Consolidated Gas Electric Light and Power Company of Baltimore, the descendant of the founding company, has published a brief history.

Under the original franchise which inaugurated the gas industry of America, and the charter rights subsequently granted to The Gas Light Company of Baltimore—which from time to time have been amended and extended—the Consolidated Gas Electric Light and Power Company of Baltimore, the descendant in direct line of the founding company, operates today.

"Since the founding company began operations," the review states, "throughout the financial panics and depressions of the 125 years that have embraced the Mexican, Civil, Spanish-American and World Wars, there has never been a receivership nor a general failure of the supply of gas—not even during the great Baltimore fire in 1904."

While the gas business in Baltimore is 125 years old, the current year marks the 60th anniversary of the incorporation of Baltimore's first electric company. Thirty-five years ago on June 20, 1906, Baltimore's gas and electric companies were consolidated and the present Consolidated Gas Electric Light and Power Company of Baltimore formed. The company of which Herbert A. Wagner is Chairman of the Board and President today serves gas to 237,000 customers and electricity to 302,000 customers. Its distribution systems are wholly within the State of Maryland and serve Baltimore and contiguous territory of 2,269 square miles with an estimated population of 1,178,000.

The booklet also reviews the growth of the company during the quarter-century following its Centennial in 1916.

Spring Conference Delegates Visit Association's Laboratories

Marking the close of the Executive Conference of the American Gas Association held in Cleveland, Ohio, on May 22-23, 1941, an informal inspection trip through the Testing Laboratories was made. More than 30 executives from various sections of the country took advantage of this occasion to inspect the expanded facilities of the Laboratories, and to observe various test procedures and current research activities under way.

Visiting executives were afforded an opportunity to inspect apparatus and procedures employed to determine their compliance with applicable American Standards. All equipment is of the most modern type, much of it being particularly designed for its purpose. Particular mention may be made of the so-called "magic eyes," a photoelectric reflectometer recently developed by the Laboratories for judging even baking characteristics. Probably the most important single item is a gas-cracking plant by which manufactured gas for test purposes is produced on the premises from natural gas locally available.

Research has played an important part in development of nationally acceptable requirements and in achievements of the Laboratories. Hence, a great deal of interest was shown by the visiting executives in current research activities, particularly in projects under supervision of the Association's Committees on Domestic Gas Research and Industrial Gas Research.

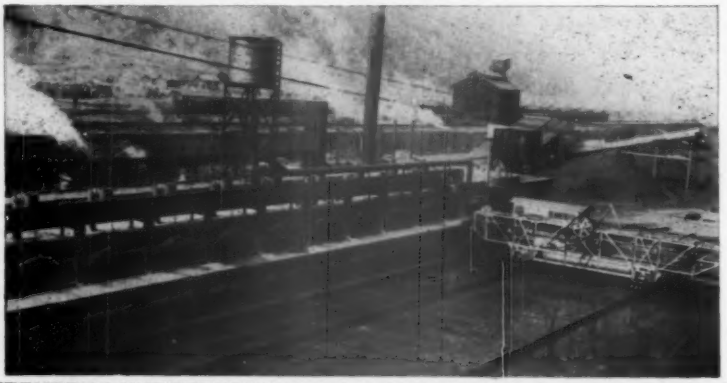
The most recent problem assigned to the Laboratories is an extensive investigation of summer gas air conditioning equipment under supervision of the Joint Committee on Summer Air Conditioning.

Among the visiting delegates: from left to right—Marcy L. Sperry, Pres., Washington Gas Light Co., Washington, D. C.; J. V. Strange, V. P. & Gen. Mgr., United Gas Corp., Houston, Texas; Maj. T. J. Strickler, Pres., American Gas Assn. and V. P. & Gen. Mgr., Kansas City Gas Co., Kansas City, Mo.; Louis Ruthenburg, Pres., Servel, Inc., Evansville, Ind.

Visitors were shown the various appliances already assembled at the Laboratories for this work, two of which were in operation. It is confidently expected that completion of this project will make available to the industry much valuable engineering and economic data on the design and application of such equipment, with a resultant increase in summer gas load.

Books. New catalog of the Chemical Publishing Co., 234 King St., Brooklyn, N. Y., covers books of importance in many technical and scientific fields including books of interest to the chemist, engineer, scientist, architect, aviator, metallurgist, technician, machinist etc.

CURRAN-KNOWLES GAS AND COKE OVENS



Strong reactive metallurgical coke is being produced in this Curran-Knowles plant from low volatile expanding coal **without blending.**

REACTIVE COKE

Is better for domestic and many metallurgical uses.

Coal Carbonizing Company

Bank of Commerce Building **St. Louis, Mo.**

Poe Speaks on Defense Program

Too many Americans are naively unaware of the "softening up" process being used by subversive interests to undermine the American way of life and something should be done about it, E. Holley Poe of New York declared at Lexington, Ky. on June 20th at the convention of the Kentucky Oil & Gas Association.

Commenting on the ability of the natural gas industry to do its full part in meeting the exacting requirements of the defense program, Mr. Poe said the nation's natural gas reserves are conservatively estimated to be 85 trillion cubic feet. "Through proration and practical conservation methods," he stated, "these reserves are being developed and produced so that supply will meet demand." He said there is in operation today 84,700 miles of natural gas trunk lines, ready to deliver gas fuel to strategic points of the nation in aid of a peace-time defense program without greatly impairing service to normal markets.

"Under the recently declared national emergency and with an increased tempo in the defense program," he said, "there doubtless will be a necessity for the building of new natural gas pipe lines to augment delivery to certain areas of the nation. Excepting inhibiting priorities these can be built as rapidly as needed."

He emphasized the fact that the gas industry is in a particularly strong position to meet national defense needs and that its part in this program will be increasingly important.

"We are preparing the way for amazing new uses of natural gas, many of which we shall see in our own time," he predicted. "The present by-products of the industry include toluol, used in the manufacture of high explosives, carbon black and scores of other essential chemicals. If our imports of natural rubber cease, the entire rubber needs of this country can be supplied from synthetic rubber made from petroleum hydrocarbons. And this product will be better than natural rubber."

Grand national prize winner in the high school food project sponsored by Servel, Inc. is 17-year-old Mae Lee Dow, of Grand Rapids, Michigan (left). She is shown arriving at the Chicago airport on her way to Los Angeles where she was entertained for several days as part of her award. Accompanying her were Miss Carmen Mains (right), her home economics teacher, and Miss Lucille Hall, home economics director of the Michigan Consolidated Gas Co., of Grand Rapids.

The Foods project, which had as its main objective preparation of the youth of the nation for their future jobs of homemakers of the nation, was sponsored for the second consecutive year by the Home Economics Department of Servel, headed by Martha Jane Tupper, which awarded Miss Dow not only the all-expense trip to and from California, but also a $100 college scholarship, and a Servel Electrolux refrigerator for her high school's home economics laboratory. Miss Dow's two companions were also guests of the company. Among the festivities planned for the cooking champion and her party while on the West Coast was a trip to Hollywood.

Chattanooga Gas Co. Has New Rate Schedule

Acting upon a petition by the Chattanooga Gas Company, the Tennessee railroad and public utilities commission has approved a new schedule of domestic gas rates for Chattanooga, which will mean savings ranging up to 38 per cent to consumers. The new rates will become effective after the August meter readings. The new rates applicable to domestic consumers are: First 200 cu. ft. $1.00 per 100 cu. ft. Next 7,800 cu. ft. per month, 7 cents per 100 cu. ft. All over 8,000 cu. ft. per month at 3½c per 100 cu. ft.

Consumers using gas refrigerators are given a special discount ranging up to 90 cents per month.

Mr. A. J. Goss, vice-president and general manager of the company, explained that the gas company has been trying "diligently for many years to bring natural gas to Chattanooga."

The federal power commission and the Tennessee railroad and public utilities commission now have before them the problem of determining whether Chattanooga should be included in the market area of the Southern Natural Gas Company or of the Tennessee Gas and Transmission Company. Until these decisions have been rendered, it is impossible to predict when natural gas will become available.

The rates are to remain in effect until natural gas is available or until the schedule is modified by order of the commission.

Consolidated Edison Revises Financing Terms

In line with the Federal government's expressed policy regarding curtailment of installment selling in view of the present emergency and the needs which may develop for national defense, Consolidated Edison Company of New York, Inc., has revised the financing terms applying to the selling of major electric and gas appliances under the company's Three-Year Cooperative Plan. The new terms became effective June 20, and call for a reduction of the maximum period for time payments from 36 to 24 months and for larger initial down payments. The principal items in this category are refrigerators and ranges. The installment period on other appliances such as laundry and kitchen equipment has been reduced from 24 to 12 months.

GOODMAN
USED SINCE 1897
Z HANDLE & LOCKING SLEEVE
GAS MAIN STOPPER

The Reliable Shut-Off for Street Mains

THE GOODMAN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

Ask for circulars on this and other distribution equipment.

Nearly a half century of service to the Gas Industry.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York

Pacific Heating and Air-Conditioning Exposition

Climatic variations in the western slope of the United States for which this Exposition was particularly designed, embrace both hot and cold extremes of the temperate zone, shading off to the mild and relatively constant conditions found on the Pacific Coast. Contrasted with the specific types of equipment required for cold weather heating, on the one hand, and hot weather cooling, on the other, the Pacific Heating and Air Conditioning Exposition created an especially favorable setting for combination units and all forms of multi-purpose equipment.

Fraser & Johnston Co. of San Francisco exhibited their "Biltwell" model H air-conditioning furnace which is a horizontal model for attic or to be installed under the floor.

The products exhibited by the Utility Fan Corp., Los Angeles, included heating equipment which incorporates an original design of heating element, and is built for both gravity and forced air circulation.

C. A. Dunham Co., Chicago, displayed one type of low-pressure steam heating equipment, in which the heat supply is automatically governed in response to change in outside air temperature and wind. The central system includes a resistance thermometer which enables the operator in the boiler room, or the manager in his office, to determine the temperature within the building.

Fraser Furnace Co., Stockton, Calif. exhibited one of a series of streamlined units designed for gas firing which incorporates filter and blower units within the heater, being under complete automatic control. A feature of this equipment is the inclusion of a "Heat Trap" which contributes to increased efficiency.

Dowagiac Steel Furnace Co. exhibited their gas-fired winter air conditioners which are scientifically baffled to obviate noises due to expansion. Also Dowagiac Arrow Gas furnaces equipped with cast iron atmospheric drilled port burners, designed especially to fit the combustion space available in the heat exchanger.

Atlas Heating and Ventilating Co., San Francisco showed units in its line of winter gas fired floor furnaces and air conditioners.

Reznor Mfg. Co., Mercer, Pa., demonstrated the wide adaptability of their unit heaters by exhibiting only two basic units; one a suspended type, the other designed for floor mounting.

An interesting safety device shown by the Mercoid Corporation of Chicago, is actuated by light in such a way that the extinguishment of the gas burner flame automatically cuts off fuel and ignition, thus preventing firebox explositions.

Electrogas Furnace Co. of San Francisco, exhibited a forced air heating system for the home, show or industrial plant. This unit is particularly adapted to buildings where space is of primary consideration.

General Electric displayed their type LC gas furnaces for steam, hot water, vapor and split heating systems.

Coke Oven Plant at Chester, Pa. Now Being Rebuilt

Industrial use of gas in the area adjacent to Philadelphia has increased over 50 per cent in four months, causing the Philadelphia Electric Company to place orders for the immediate rebuilding of its idle coke plant at Chester.

The cost of the improvement will approach a million dollars and the new plant will be in production in less than a year.

Orders have been placed for 21 coke ovens which will produce 10,000,000 cubic feet of gas a day.

To enlarge the present plant, and have room available for a future storage tank, the property of the Delaware River Steel Company, adjacent to the present gas plant, has been purchased. This includes a steel blast furnace which has been idle and unused for eleven years. However, government defense officials believe that the furnace, if leased or sold by the Philadelphia Electric Company, can be put into production quickly and produce some 300 tons of pig iron a day. Plans are maturing toward that end.

The new coke ovens will use about 400 tons of coal a day and produce as by-products of the gas, some 275 tons of coke which will be sold commercially or used in the manufacture of "oil gas" at other company plants.

This is another step in the long range program of the Philadelphia Electric Company to keep its territory well supplied with this vital service.

Appalachian Meter School Proceedings Published

The Proceedings of the Third Annual Appalachian Gas Measurement Short Course have been printed in book form and have now been distributed to all who were registered at the 1940 meeting.

The proceedings cover papers read and discussed on the general theme "The Theory and Practice of the Measurement and Control of Gases." It is a paper cover, bound volume of 485 pages containing many photographs, charts, curves and diagrams making the text interesting and easy to follow.

A limited number of extra copies are available at $1.00 the copy by addressing Mr. G. R. Spindler, Director of the School at West Virginia University, Morgantown, West Virginia.

The dates for the fourth meeting, which will be conducted under the chairmanship of Mr. A. F. Kraus, of the Peoples Natural Gas Company of Pittsburgh, have been announced as August 18, 19, and 20, 1940.

Recorders. A newly designed strip-chart recorder is now offered by The Bristol Company, Waterbury, Conn. Many changes have been made in the construction of these new instruments, including the case design, chart drive, measuring elements and writing mechanism.

Dunn Elected Vice-President of Vulcan Proofing Company

At a recent meeting of the Board of Directors of the Vulcan Proofing Company, Brooklyn, N. Y., Joseph Cameron Dunn, formerly the company's General Sales Manager, was elected Vice-President. Mr. Dunn will continue in direct charge of the sales department.

J. C. Dunn

Born in Troy, N. Y., Mr. Dunn was graduated by Rensselaer Polytechnic Institute in 1915. His first job after leaving school was with E. I. Dupont de Nemours. Later, in 1923, he became associated with the Vulcan Proofing Company, where he has continued for eighteen years, first in an advisory capacity, in connection with the manufacturing departments, then in the sales department, then General Sales Manager, and now Vice-President.

During Mr. Dunn's service with Vulcan the company has gradually changed its production from rubber proofing products to its present line of gas meter and regulator diaphragms and other technical products. He had a very large part in the development of these diaphragms.

Photographic Contest Extended

Connelly Iron Sponge & Governor Co., has announced that the photographic contest originally scheduled to end June 30th will be extended to August 31. The purpose in granting this extension is to give an opportunity to many who have signified their desire of entering the contest to take suitable photographs.

Details of the contest, announced in the March issue, started April 1st, and is open only to employees of gas companies and their families.

Photographs of real pictorial merit taken in or around gas plants will be eligible for the grand award. It is not necessary for Connelly purifying materials and apparatus to be visible in the pictures submitted for this top prize.

For entry blank write to R. W. Stafford, Contest Manager, 3154 S. California Ave., Chicago, Illinois.

INDEX TO ADVERTISERS

American Meter Co. 6
Autogas Corporation 30
Barber Gas Burner Co., The 32
Besse, Osborn & Odell ..... —
Blaw-Knox Company ..... —
Carbide & Carbon Chemicals Corp. ..... —
Cast Iron Pipe Research Assn., The ..... —
Chaplin-Fulton Mfg. Co., The 32
Clark Bros. Co. ..... —
Cleveland Gas Meter Co. ..... —
Cleveland Trencher Co. 2
Coal Carbonizing Co. 40
Connelly Iron Sponge & Governor Co. ..... —
Cribben & Sexton Co. 4
Cruse-Kemper Co. 29
Dresser Mfg. Co. ..... —
Gas Machinery Co. ..... —
Gas Purifying Materials Co. 43
General Coal Co. ..... —
Harper-Wyman Co. 19-20
Henry Furnace & Foundry Co. ..... —
Lambert Meter Co., Inc. 29
Lattner Mfg. Co., P. M. 18
Lavino & Co., E. J. 29
Lennox Furnace Co. ..... —
Merco-Norstrom Valve Co. ..... Front Cover
Metric Metal Works 6
Monmouth Products Co. 26
Phillips, Alfred I. 32
Pittsburgh Coal Co. ..... —
Pittsburgh Equitable Meter Co. ..... Front Cover
Reed Manufacturing Co. 36
Remington Rand Co. ..... —
Republic Heaters Sales Co. 30
Reynolds Gas Regulator Co. 26
Roberts-Gordon Appliance Corp. ..... —
Robertshaw Thermostat Co. ..... —
Roper Corp., Geo. D. 25
Ruud Manufacturing Co. ..... —
Safety Gas Main Stopper Co. 41
Semet-Solvay Engineering Corp. 3
Servel Electrolux Div. ..... —
Skinner Co., M. B. ..... —
Sprague Meter Co., The ..... Fourth Cover
Stacey Bros. Gas Construction Co. 38
Superior Meter Company 39
Titan Valve & Mfg. Co., The ..... —
Union Carbide & Carbon Corp. ..... —
United Engineers & Constructors, Inc. 29
West Gas Improvement Co. ..... —
Worthington Pump and Machinery Corp .... —

Tar De-emulsifier For Sale

One used tar pressure de-emulsifier in good condition. Capacity 1400 gallons per batch. Address Box No. 120, c/o American Gas Journal, 53 Park Place, New York City.

A Book for Gas Appliance Salesmen

Domestic Gas Appliances by A. M. Apmann. Gives practical working knowledge of the technology of appliances and characteristics of fuels. Ranges, Water Heaters, House Heating and Refrigeration are fully discussed. 238 pages, many illustrations, stiff cover. Special close-out price, 50c. American Gas Journal, 53 Park Place, New York.

Apartment House Refrigeration Featured in Servel Portfolio

The results of an extensive survey of the apartment house refrigeration market forms the subject of a portfolio which has been issued by Servel, Inc., for use by gas appliance salesmen. This portfolio has been designed to assist sales forces of gas companies that are seeking the apartment house business so that they may forcefully carry their message to architects, builders, contractors, owners and others in this field.

Reasons for the big swing to gas refrigeration are cited not only from the owner's but from the tenant's standpoint. A simplified diagram explains the operation of the Servel Electrolux freezing system. Construction features of the apartment house gas refrigerator, initial costs and operating and maintenance costs are provided to show how the gas refrigerator saves an owner money over a period of years.

Several representative apartment houses throughout the country are listed showing the building and length of service of gas refrigerators in each of these buildings. Enthusiastic endorsements by both apartment house owners and tenants are quoted.

Helpful Free Handbook for Gas Range Salesmen

Well worth the attention of every sales manager interested in increasing sales volume on his better gas ranges, is a new 48-page hand book for salesmen, entitled "How to Sell More Gas Ranges." The book is free, and is being distributed by Harper-Wyman Company, makers of the Harper Burner System.

The hand book features twelve tested and practical floor demonstrations which give customers visual proof of the superiorities of the modern gas range. These demonstrations can be performed quickly and effectively on any sales floor, and, by and large, require no expensive equipment other than a connected modern range.

They give the salesmen full instructions on how to demonstrate such features as "keep warm" heat, "absent cooking," vitamin-preservation in foods, cooking without wasted fuel and numerable other advantages of interest to every housewife. The booklet also features a series of "selling sentences," which accompany each demonstration and are designed to help the salesman put over his important selling points verbally.

The booklet is attractively printed in two colors, is pocket size, and very readable. It may be obtained in quantity by addressing Harper-Wyman Company, 8562 Vincennes Avenue, Chicago.

The *Test* of REPETITION

A STABLE & PROGRESSIVE industry operates on a stable & progressive policy. *"I know of no way of judging the future but by the past,"* said Patrick Henry. In 1940 GPM shipped 1,750,000 bushels of iron boring oxide sponge of which 1,500,000 were repeat orders.

Gas Purifying Materials Company

Long Island City, N. Y.

GPM IRON HYDROXIDE

Water Heaters

(Continued from page 17)

Supporting data[26] on comparative efficiencies of water heaters are referred to in the footnotes, particularly to show how desirable it is to use the smallest heater which can supply the peak demand because of the lower efficiencies of a water heater when the amount of water used per day is only slightly more than the capacity of its tank (or in some cases even less than this capacity).

There is also a statement[27] regarding the comparative cost to build a heater along the lines proposed and a standard present type heater.

If we have bluntly exposed weaknesses in present water heater designs, we have done it only because we are sure that it is possible to overcome these weaknesses at a not unreasonable cost.

(26) Monthly service efficiency of automatic storage water heaters at draws of various percentages of tank capacity are given in the A.G.A. Bulletin No. 9.

(27) In order to get the comparative cost for a regular manufacturer to build Specification water heaters in quantities comparable to those in which present heaters are built, a detailed parallel estimate was made of the cost to build (or in the case of certain accessories to purchase, as is now done, parts to be assembled with the other parts of the heater which the manufacturer builds) covering every item of material and labor entering into the construction. The estimate in each case was figured on the basis of building only 500 heaters. The costs below refer only to the bare-bones direct cost of material and labor because overhead costs vary so greatly with the quantity produced, although they would not be likely to vary a great deal for building the same number of either type of heater.

The bare-bones cost of the tank for the Specification heater is about 50% greater than that for the ordinary galvanized tank. (The total enameling cost is $3.28). The costs of the casing and the burner and control equipment are about equal. The assembling of the Specification heater costs about 30% more than that for the standard heater. The total bare-bones cost is about 25% more than that of present heaters.

Filling Gas Main

(Continued from page 28)

sockets to fit ¾", 1", 1¼" and 2" pipe plugs.

(20) One 4' length ¾" pipe equipped with ¾" tee and ¾" plug.

(21) One 1" service stopper.

(22) One 1¼" service stopper.

(23) One 1½" service stopper.

(24) One 2" service stopper.

Grease, as specified below, should be dispatched with each pumping outfit:

Five 100-pound drums Gulf H.M. Grease (Used from May to Oct., inc.), or

Five 100-pound drums of 50% Gulf H.M. Grease and 50% Gulf No. 2 Cup Grease (used from Nov. to April, inc.)

One follower plate in each drum.

Empire State Gas & Electric Association Dissolves

The Empire State Gas & Electric Association, which was formed in 1905 to facilitate the interchange of information among gas and electric utilities in New York State, has decided to dissolve because its revenues have been cut in half by the resignation of several utility companies.

Liquidation of the affairs of the association, which included 98 per cent of the state industry in its membership, is now going on under the direction of George Smith, the former secretary.

J. B. Nealey Technical Adviser to General Lewis

Mr. J. B. Nealey, who has been with the Priorities Division of the Office of Production Management, in Washington for some time, handling aluminum, has recently accepted an appointment in the Office of Chief of Ordnance in the War Department. With the title of Senior Journalist and as technical adviser to General Lewis, his work will be very similar to that he carried on so successfully for the American Gas Association for so many years. One of Mr. Nealey's duties will be to write a book on Ordnance based on new developments in war material necessitated by modern warfare.

Bradbury Rejoins Quality

William T. (Bill) Bradbury recently returned to the scene of earlier activity as Works Manager of the Roberts & Mander Stove Company, Hatboro, Pa., with whom he was formerly associated from 1935 until 1937. Prior to rejoining Quality, Mr. Bradbury served as Sales Manager and Director of Engineering for the Newark Stove Company, Newark, Ohio, resigning this position in order to assume his new duties. Mr. Bradbury's outstanding ability in plant and production engineering is well known throughout the range industry in which he has had wide experience.

Water Heaters. Catalog No. 41 of Hotstream Heater Co., 8007 Grand Ave., Cleveland, includes complete illustrated descriptions of their gas fired water heaters, floor furnaces, room heaters and various accessories. Useful tables and charts are included.

Obituary

GEORGE J. HECKENDORN

George J. Heckendorn, Gas Distribution Engineer of Public Service Company of Colorado, died June 1, 1941, following a three-day illness.

Mr. Heckendorn was born in Richland Center, Wisconsin, on January 24, 1899. His grade and high school education was obtained at Greeley, Colorado. During World War I, he saw overseas service in Motorcycle Company No. 322, A.E.F., from March, 1918, to August, 1919. He entered the University of Colorado in 1919, graduating in 1923, with a degree of Bachelor of Science in Mechanical Engineering. He was a member of Tau Beta Pi. Mr. Heckendorn joined Public Service Company of Colorado in July, 1923, working since November, 1923, in the Gas Engineering Department.

He was a recognized authority in the gas industry and was a member of the American Gas Association.

ROY L. SMITH

Roy L. Smith, superintendent of construction for Koppers Company, Engineering and Construction division, died June 22, following a brief illness. His home was at Mt. Lebanon, Pittsburgh.

Mr. Smith was born in Moundsville, W. Va., Nov. 10, 1888. He received his public school education in Claysville, Pa., following which he studied engineering at Purdue University and Carnegie Institute of Technology. He was successively associated with Chaney and Armstrong, Washington, Pa., the Pennsylvania Department of Highways, and the Lake Erie and Ohio River Ship Canal Board from 1910 to 1916, when he joined the Koppers organization. He was a field and erecting engineer until 1925 when he was made assistant superintendent of construction. He was made superintendent of construction in 1936, the position he held at the time of his death.

Mr. Smith enlisted as a private in the Fifteenth Regiment of Engineers in May, 1917 and was discharged as the captain of his company in July, 1919. He had been awarded the Distinguished Service Cross and the Order of the Purple Heart.

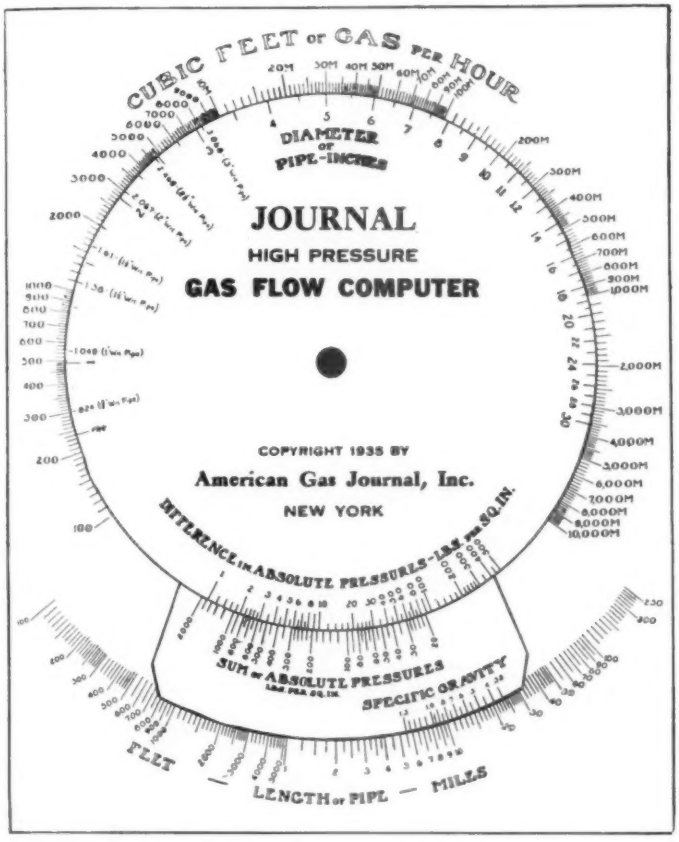
GUY A. BARKER

Guy A. Barker, manager of the public utility and electrical products departments of Johns-Manville, died June 18 soon after he suffered a heart attack at his home in Scarsdale, N. Y. He was 50 years old.

Mr. Barker started his career with Johns-Manville as a sales engineer, later serving as a Pacific Division sales manager and a Chicago district sales manager, before coming to New York in 1933 to become manager of the electrical products department. He was made manager of the company's public utility and electrical departments in April of this year.

HUGHES PRINTING CO.
EAST STROUDSBURG, PA.

"Journal" Gas Flow Computers



New Improved Gas Flow Computers now available of durable celluloid, encased in a convenient leatherette cover with complete instructions.

Actual Size 6¼ x 7½

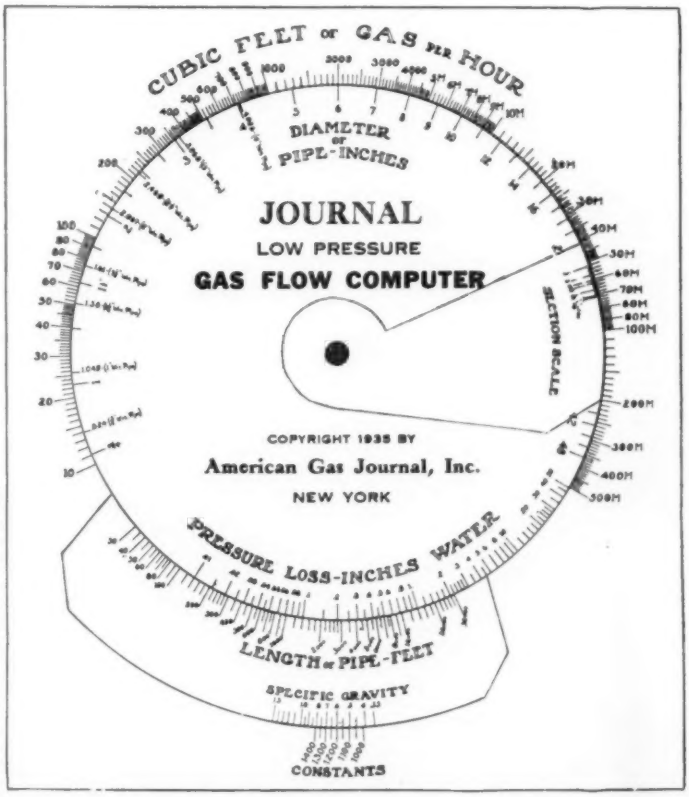
High Pressure Computer Range:

Cu. Ft. of Gas Per Hour—100-10,000 M
Diameter of Pipe Inches ¾-30
Difference in Absolute Pressure—Lbs. per sq. in. 1-500
Sum of Absolute Pressures—Lbs. per sq. in 2000-20
Specific Gravity 1.5-.35
Length of Pipe—Feet 100-5000
Length of Pipe—Miles 1-250

Low Pressure Computer Range:

Cu. Ft. of Gas Per Hour—10 to 500 M
Pipe Diameter ¾" to 48" (including standard and actual weight up to 4")
Pressure Loss Inches .01-10.
Length of Pipe—Feet 30-30,000
Specific Gravity 1.5-.35
Constants 1400-1000

Price $3.50 Each, Postage Prepaid



AMERICAN GAS JOURNAL
53 Park Place, New York

Please enter our order for Computers as follows at $3.50 each, postage prepaid

....HIGH Pressure Computer

....LOW Pressure Computer

NAME .....

ADDRESS .....

SPRAGUE

● Forward and on to better equipment — now more than ever, discriminating engineers are recognizing the real value of Sprague's Policy of simplified mechanism and precision construction which insures unequalled accuracy in measurement.

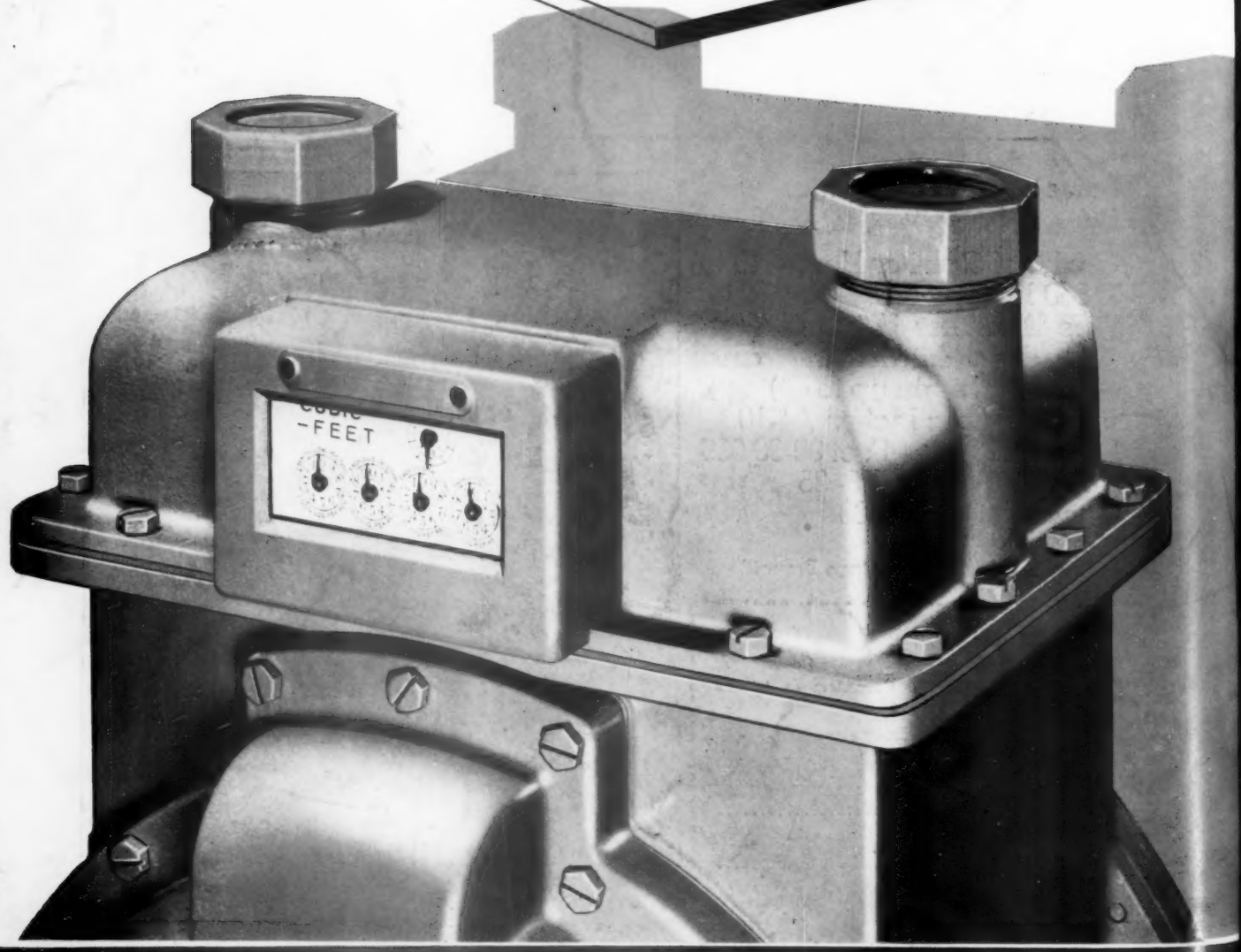
MARCHES

FORWARD

SPRAGUE METER No. 4

designed for small industrial installation offers greater capacity in a more compact unit. Rugged in construction, made of cast iron, makes for rigid strength, and simplified mechanism permits a small meter with greatest efficiency. Capacity 600 cu. ft. at ½" W.C.

For complete information write today for catalogue No. 22



THE SPRAGUE METER CO. BRIDGEPORT, CONN.

DAVENPORT, IOWA • LOS ANGELES, CALIF. • HOUSTON, TEXAS • SAN FRANCISCO, CALIF.